

Progress Report on Team Commitments to Action

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PROGRESS REPORT ON TEAM COMMITMENTS TO ACTION

FROM THE
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FOREWORD

The joint efforts of government and industry contribute fundamentally to realizing national quality and productivity objectives in assuring superior products and services in the competitive world market. Successful teamwork is crucial to this effort. Sharing quality and productivity information is the key to achieving excellence through teamwork for NASA and its contractors.

In December 1986, the Second NASA Symposium on Quality and Productivity inspired government and industry representatives to form commitments for quality and productivity improvements within their organizations. This document is a compilation of progress reports on the participating organizations' commitments to action. These reports reflect dedicated efforts by both management and employees to improve the quality of their work and work life and to reach the goals that were outlined over a year ago. NASA is very proud of the efforts made by these organizations and we feel there is a great deal to be learned from their progress reports.

We commend these organizations and hope the information contained in this document will provide new ideas and encourage continuous quality and productivity improvement throughout government and industry.

ames C. Fletcher Administrator

INTRODUCTION

In November 1986, NASA invited organizations to send teams of key executives to participate in the Second NASA Symposium on Quality and Productivity. The philosophy behind this request was that high-level managers can stimulate change in an organization and would conceivably be more effective if they could share their thoughts and perceptions with other team members and arrive at a consensus for actions which could be initiated to increase the quality of goods and services and the productivity of the work force. Sixty-two organizations identified actions that could be initiated to increase quality and productivity in their organization. These initiatives were published by NASA in 1987 as "Commitments to Action."

We are pleased to report that 100 percent of those organizations submitted progress reports on their commitments. This response is most gratifying and is an indication that government and industry executives are sensitive to the critical need for quality and productivity improvement and are indeed making progress by working diligently toward their goals.

This document summarizes the actions taken by government and industry representatives during the reporting year. I would like to commend the organizations that participated in this program. Their efforts are instrumental in achieving our mutual goal of continuous quality and productivity improvement.

Joyce R. Jarrett

Jajec R. Jarrett

Director, NASA Quality and Productivity Improvement Programs

Organization: BALL AEROSPACE SYSTEMS DIVISION

Contact: George E. Yurka, Director, Quality/Productivity Improvement

Address: P. O. Box 1062

Boulder, CO 80306

COMMITMENT TO ACTION:

Ball Aerospace Systems Division (BASD) has implemented a quality improvement program called "The Challenge: Pride in Excellence," and it is the overall division program for achieving improvement in the quality of our products, processes, and worklife, and in our productivity as individuals, as projects, and as a company.

ACCOMPLISHMENTS:

We at Ball Aerospace Systems Division have significantly advanced our quality improvement program called "The Challenge: Pride in Excellence" over the past year. We have completed the training of all of our work force in the concepts and each person's role in the process. We have made extensive use of Juran type project teams to go through the steps, from root causes through recommendations for the solving of chronic problems. The 45 project teams made 165 recommendations of which 131 have been implemented to date. In addition, our Action Request system has been used extensively for the identification by workers to their supervisors of roadblocks or errors in their work processes which hinder quality performance. As one would expect in a site-wide program, it has worked better in some areas then in others. Now that we have the basic system in place, we can assess what is working best and adjust accordingly to suit the various functions.

BENEFITS:

The program has helped the employees to feel more involved and has stimulated interest in the improvement of their own work processes as well as their interface with others. Most who served on problem-solving teams appreciated that opportunity and were pleased with the results. One of the greatest benefits was improvement in communications between supervisors and employees as well as across functional boundaries and with upper management. Upper management also has an increased awareness of specific needs for improvement.

SUCCESS OF APPROACH:

In general, the approach of implementing from the top down was successful. However, we do have pockets that need additional help. We see positive signs and actions in many areas but it will take time for the participative process to become part of everyday operations. We found we had to narrow the scope of some of the teams to keep them from trying to solve too much at one time and/or diluting their primary effort. The team recommendations were generally well thought out and justified in most cases. Also, as expected, the management review/selection process of recommendations from project teams is a time-consuming process that must be done well and with positive feedback. It also is very clear that it takes commitment and demonstrated positive actions to be successful.

Organization: BAMSI, INC.

Contact: Gerald R. Langston, Director of Operations

Address: P. O. Box 1659

Titusville, FL 32781-1659

COMMITMENT TO ACTION:

la Increase productive hours of the BAMSI work force by decreasing the nonproductive leave hours by I percent over the next 12 months.

2a Increase employees awareness of the importance of serving the customer's needs better, faster, and smarter.

3a Educate and sensitize every customer to BAMSI's overall technical support capabilities in addition to those specifically contracted to perform at that customer's location.

ACCOMPLISHMENTS:

Ib During calendar year 1987, BAMSI, Inc., management embarked on an in-depth analysis of all aspects of productive and nonproductive labor hours. Major strides were made into understanding the constituent parts of the total labor force and identifying specific categories of nonproductive labor for management attention. Certain aspects of nonproductive labor were determined to be outside the normal management influence, such as vacation and holidays, while sick leave and leave without pay (LWOP) are clearly controllable to varying degrees. Further evaluation of sick and LWOP time suggested concentration on sick leave and associated unexcused absences. These analyses resulted in management emphasis on improving the employee working environments with attention to safety and the prevention of accidents, soliciting and implementing employee suggestions on the process and workplace improvements, and careful monitoring of excused and unexcused absences. Each BAMSI Project Manager has been brought into the effort and chartered with maintaining a constant vigilance over the total of all labor hours expended at the project level and finally at the BAMSI Corporate level by decreasing management.

During the period of evaluation, BAMSI, Inc., experienced significant growth with substantial gains in productive hours. This growth resulted in increased nonproductive hours, outside the normal control, by approximately 1 percent. Due to increased emphasis on control of the remaining nonproductive categories, BAMSI experienced a very positive change in the ratio of productive versus nonproductive hours of 0.15 percent. We are further encouraged by the in-depth understanding we have gained into productivity which has enabled BAMSI to concentrate management attention on the process, and we look forward to continued improvements in 1988.

2b BAMSI, Inc., has always aggressively pursued improved customer relations through continuous direct corporate communications, and, most importantly, through our employees who enjoy day-to-day customer interface. During 1987, BAMSI increased contract visits by executive management and individual BAMSI employees as well as group settings. This interface between top management and employees emphasized the importance BAMSI places on each contract, our employees, and drove home the fact that BAMSI considers the customer first and foremost in our daily operations. Employees are

constantly reminded of the ambassadorial role they play each and every workday and that customer satisfaction is the first priority.

The project visits and emphasis by executive management, coupled with the annual managers' conference, employee recognition awards and banquets, newsletters and quality circles, have provided the forum for continuous emphasis on customer relations. Our success is measured by the vast majority of our contracts receiving superior performance rating and accolades on our corporate spirit and "can-do" attitude. BAMSI has successfully merged the interests of our employees and customers into a united effort striving toward fulfillment of our mutual goals.

3b This action has been centered around the individual project managers located throughout the continental United States. Coordination between the President of BAMSI, the Director of Operations and the operating Project Managers has developed into a closely coupled network with high levels of communication between the customer's organization and those of the project and corporate office. Dissemination of information and corporate skills is a continuing process in a dynamic organization like BAMSI, and it is extremely important that our customers are apprised of all new capabilities and technologies of the corporation. Nineteen hundred eighty-seven was very successful for our corporation in getting the information to the decision-makers and has resulted in the overall enhancement of the BAMSI corporate image and capabilities nationwide.

Organization: BENDIX AEROSPACE SECTOR

Contact: Louis W. Smith, Vice President, Production Operations

Address: 1000 Wilson Boulevard

Arlington, VA 22209

COMMITMENT TO ACTION:

Maintain an energetic continuous improvement process covering our services and products.

ACCOMPLISHMENTS:

Bendix Aerospace has made great progress over the last year in developing and implementing our improvement effort which we refer to as "Commitment to Continuous Improvement." Our approach is a total commitment of all of our people striving for excellence.

A significant effort was spent this year in developing a manual for implementing our Commitment to Continuous Improvement initiative. This manual was published in December and is now a working guide for our divisions.

The essence of the manual is the presentation of a continuous improvement model consisting of the essential elements of leadership, implementation strategy, problem solving, evaluation of progress, and recycling to a higher level of improvement.

The entire process is a total organization approach toward improvement which requires the involvement of all employees.

BENEFITS:

The continuous improvement process is a long-term strategy which may take years to realize its full potential. However, we have already seen some exciting results in the short term. For example, at one location the use of SPC has reduced soldering defects to less than 0.2 defects per board. The total number of touch-up operators has been reduced from nine to two. Shelves for storage of in-process boards have been removed and solder-related defects at test are virtually zero.

Our early successes leave us no doubt that we are on the right track. For example, we are seeing improved communications between engineering and manufacturing resulting in a team approach to "designing in quality" and producibility of hardware. We have made extensive use of Department of Defense's guide on "Transition for Development to Production" to achieve this result.

Organization: BENDIX FIELD ENGINEERING CORPORATION

Contact: Murray Weingarten, President and Chief Executive Officer

Address: One Bendix Road

Columbia, MD 21045-1897

COMMITMENT TO ACTION:

Bendix Field Engineering Corporation (BFEC) is a service industry-oriented entity; our product is primarily our people--dedicated technical, administrative, and management personnel. Using a total quality leadership approach, BFEC will strive to sustain a work environment predicated on corporate-wide values of quality workmanship, innovation, and customer satisfaction.

ACCOMPLISHMENTS:

Work force development and commitment examples include the following:

- BFEC undated the corporate Basics of Supervision course which is attended by first-line supervisors. The course provides the basic tools necessary to be a good supervisor and to be able to motivate a work force faced with service industry technical change. In 1987, 161 supervisors attended this course, compared with 71 in 1986, and 62 in 1985.
- BFEC offers an Educational Reimbursement Program and continued to stress the need for employees to improve the technical and management skills associated with their positions. In 1987, BFEC approved 1,343 educational assistance applications, up from 1,139 applications in 1986 and 706 in 1985.
- In a labor-intensive service industry, quality and productivity are directly related to employee absenteeism. Through an approach that includes recognition and awards, employee absenteeism was significantly reduced--26 percent over the past 10 years. BFEC employees, on the average, are absent only 5 days per year (nonvacation time such as illness or emergency leave).

BFEC continued to achieve sustained service excellence. Examples of this commitment and the achieved results include the following:

- On a contract at the Goddard Space Flight Center, BFEC automated the logistics support function. In 1987, the logistics element provided an outstanding level of effort: 8,900 line items, worth \$5,600,000, were managed; 22,000 transactions were conducted with only 40 errors (an accuracy of 99.8 percent) and an error value of less than \$600.
- BFEC achieved a 1800-percent increase in productivity by using a system embodying artificial intelligence to schedule Tracking and Data Relay Satellite System (TDRSS)/Earth Radiation Budget Satellite (ERBS) events, while increasing the accuracy and reliability of the scheduling effort.

Organization: BOEING AEROSPACE COMPANY

Contact: Randolph Mitchell, Vice President, Operations

Address: P. O. Box 3999, Mail Stop 85-77

Seattle, WA 98124

COMMITMENT TO ACTION:

The Boeing Aerospace Company has established Quality Improvement as a major initiative and has been working for some years toward continuous improvement in all processes for the company. As a result of the NASA Quality and Productivity Symposium, our team decided to focus their attention on two processes.

- Improve the Full-Scale Development Process
- Improve the Computing Maintenance Process

ACCOMPLISHMENTS:

The Boeing Aerospace Company continues its major initiatives on Quality Improvement to produce continuous improvement in all process of the company. This reports the results of the Commitment to Action, focused on two processes.

1. <u>Improve the Full-Scale Development Process</u>. A streamlined process has been established for design, fabrication and testing of developmental hardware and software. The new process established a more responsive and flexible "systems-engineering-design-build-test" process better suited to developmental phase contracts. Emphasis is placed on quality and productivity initiatives, quality awareness, and teamwork/consensus management. At the heart of the new process is a series of product development teams focusing members of the Engineering, Manufacturing, Materiel, and Quality Assurance organizations on set product specification and requirement targets such as average unit production cost (AUPC).

We are applying the new process to three military (Air Force) development programs at this point, and we are seeing very favorable results such as:

- Design/build/test flow times reduced by 30-40 percent
- Dramatic reductions in paperwork and support organization costs.
- Product quality very high (98-percent defect free) with a "design-in, build-in," not "inspect-in" theme.
- Error-free engineering.
- A ground swell of acceptance of the change process--highly motivated people.

Methodology has been developed to migrate these teams and change processes into other new development contracts.

2. Improve the Computer Maintenance Process. In-house capability has been developed to handle computer maintenance, eliminating subcontracted maintenance and improving responsiveness. Performance in 1987 produced per computer maintenance costs essentially equal to that of the previous subcontractors, but included all non-recurring startup costs. Performance in 1988 is expected to exceed prior subcontracted performance by 25-percent reduction in costs with continued improved responsiveness.

Organization: BOEING AEROSPACE OPERATIONS—HOUSTON

Contact: Byron G. McKenzie, Houston Operations Manager

Address: P. O. Box 58747

Houston, TX 77258-8747

COMMITMENT TO ACTION:

"Operation Eagle" is the name of the Boeing corporate program for Productivity and Quality Improvement. It embodies a cost reduction program, quality improvement, and employee recognition. Policies and procedures for "Operation Eagle" are in place and will be observed throughout 1987.

ACCOMPLISHMENTS:

- 1. Qualitative. Following guidelines of Boeing's "Operation Eagle" program, we planned to use more training effort in order to help all our employees, including management, to have a better understanding of our motivation and cost-reduction programs. To that end, 425 training hours were expended, involving 682 employees. Some of the course titles are as follows:
 - Boeing Operation Eagle
 - BAO/Houston Productivity Improvement Program
 - Productivity Circles: The Task Before Us
 - BAC Quality and Productivity: An Engineering Perspective
 - Communicating Successfully
 - The Quality Improvement Process
- 2. Quantitative. Boeing Aerospace Operations (BAO)/Houston established a goal of \$554,000 in cost reduction for 1987. At the same time we targeted for participation in the cost reduction program by at least 70-percent of all Boeing employees.

We fell short of our participation goal with only 63-percent of our employees contributing cost savings. However, we were able to surpass our primary goal achieving a total cost savings of \$806,910.

- 3. <u>Motivation</u>. Another aspect of "Operation Eagle" is employee recognition. In 1987, we provided employee recognition in several ways:
 - Over \$24,000 was awarded to employees whose cost saving ideas were accepted for implementation.
 - Each month an employee was selected for outstanding achievement and identified as "employee of the month."
 - Every 3 months an outstanding employee of the quarter was awarded a check for \$100.
 - The outstanding employee for the year is recognized and awarded a check for \$500.

Organization: THE BOEING COMPANY—HUNTSVILLE

Contact: R. W. Hager, Vice President, Space Station Program

Address: P. O. Box 1470

Huntsville, AL 35807

COMMITMENT TO ACTION:

We plan to (1) expand our quality circles and Operation Eagle programs with emphasis on implementation of productivity ideas that are generated and (2) perform an organization effectiveness study to eliminate duplication and provide clear lines of responsibility in carrying out prime and support tasks.

ACCOMPLISHMENTS:

We did expand our Quality Circles and Operation Eagle Programs with emphasis on implementation of productivity ideas. We established a Huntsville review board with the necessary authority to commit company resources to implement productivity ideas. Our total cost savings and cost avoidance in 1987 was \$2,729,587 with 45.5-percent participation.

Our attention to <u>implementation</u> resulted in three major changes in the way of doing business in Huntsville that will be far more beneficial than the near-term saving reflected above. These are as follows:

- 1. <u>Microfilm Records Storage and Retrieval</u>. The METS Quality Circle suggested that a microfilming system be procured and installed for microfilming purchase orders, correspondence, employee records, finance records, etc., reducing storage space and improving access and speed of data retrieval. This suggestion was implemented and will be the standard for future Huntsville operations.
- 2. Data Traceability, Accountability, and Control (DATATRAC). Employee suggestion was to utilize DATATRAC as a management tool for data traceability, retrievability, accountability, and control for contract data. DATATRAC capabilities include requirement identification, delivery schedules, performance versus schedule, originators, transmittal documentation, customer response data and other miscellaneous information. This suggestion was implemented and will become a standard management tool in Huntsville.
- 3. <u>Centralized Engineering File Library</u>. The QPD Quality Circle suggested, and we implemented, a centralized engineering file library of vendor catalogs with information on Federal and military specifications to be implemented. This reduces lost time searching for correct catalogs as well as improving the working environment.

Our organization effectiveness study to eliminate duplication and provide clear lines of responsibility in carrying our prime and support task was delayed because of the space station award delay and the need to interact with the customer on organizational interfaces before completing the exercise. However, we did have each functional organization prepare and present to the group as a whole the general responsibilities, organization purpose, interfaces and interactions with other organizations. Some elimination of redundancies resulted from this exercise and will form an excellent basis for proceeding with the study in the early part of 1988.

Organization: THE BOEING COMPANY—BOEING COMPUTER SERVICES

Contact: Michael R. Hallman, President and Vice President, The Boeing

Company

Address: P. O. Box 24346, Mail Stop 7A-49

Seattle, WA 98124-0346

COMMITMENT TO ACTION:

A Total Quality Commitment (TQC) process is being implemented at Boeing Computer Services (BCS)-wide. TQC has a focus on control and continuous improvement of the quality and productivity of our business processes.

ACCOMPLISHMENTS:

Boeing Computer Services is implementing a management style called Total Quality Commitment (TQC). It is based on the W. Edwards Deming philosophy of continuously improving quality and productivity. Implementation is well underway following a top-down strategy. The strategy included the formation of a Quality council composed of the BSC president and his direct reports. To start, the Council participated in an educational seminar with William Conway.

Following the introductory educational seminar, the Quality Council identified 12 major business processes to be improved using the TQC process management methodology. Most of the 12 processes have been assigned ownership and documented; measurement systems are being developed to evaluate changes. Process Improvement Team training began June 6, 1987, with more than 570 trained to date.

The Quality Council actively leads TQC implementation and is currently addressing:

- Formulation of the BCS Quality Policy and implementing instructions.
- Identification of an inventory of all BCS business processes, establishment of process ownership, and prioritization of the highest leverage process of improvement in the coming year.

Education of the BCS management and supervisory staff began on May 7, 1987, and has resulted in more than 1,400 attending the Conway Quality Seminar.

At our early stage of implementation, all indications are that our approach will be successful. The most significant concern so far is the potential necessity to redeploy employees when efficiencies are realized.

Organization: BOEING COMPUTER SERVICES — BOEING COMPUTER SUPPORT

SERVICES

Contact: Michael R. Hallman, President, Boeing Computer Services and Vice

President, The Boeing Company

Address: 7980 Boeing Court, Mail Stop CV-31

Vienna, VA 22180

COMMITMENT TO ACTION:

The Boeing Computer Services Management objective is to implement the Total Quality Commitment (TQC) in all contracts during 1987. TQC is a structured process based on quality management that provides continual improvement in the way all employees do their work every day, from senior management level through the organization to every employee.

ACCOMPLISHMENTS:

To achieve a continual improvement in the way we do our everyday work, it is necessary to adopt a philosophy and method for changing and improving the fundamental business process. Focusing on the quality of our work processes, and methodically identifying and eliminating the causes of defects that result in wasted resources, will generate changes that affect all employees by improving the work environment and enhancing teamwork. The result is increased efficiency, product and service quality, and customer satisfaction.

Education in the TQC philosophy and methodologies was begun in 1987. This was generally accomplished through the use of seminars, videotapes, pamphlets, and assignment of TQC focal points. Representatives from the management teams on all support services contracts are participating in the Conway Quality Seminars.

Operating structures to process TQC efforts are being developed on support services contracts. Some activities are in the early stages of implementing interdiscipline improvement teams.

Specific productivity programs are used to solicit ideas and document productivity and quality improvement results for our customers. Such programs are and will continue to be administered as part of our TQC program. Operation Eagle is an outstanding example. During 1987, employee participation in Operation Eagle programs, which encompasses a suggestion system, resulted in more than \$18,000,000 in approved saving suggestions to our customers. On many contracts this was a substantial improvement over previous years, reflecting an increased level of interest and participation by all employees.

The TQC process is a long-term commitment by Boeing. The effort is well under way on our contracts, and we are confident the approach will be very successful in the support service contracting environment.

Organization: COMPUTER SCIENCES CORPORATION—APPLIED TECHNOLOGY

DIVISION

Contact: Dr. Thomas Williams, President

Address: 6521 Arlington Boulevard

Falls Church, VA 22042

COMMITMENT TO ACTION:

la We propose to establish a Productivity Improvement Quality Enhancement (PIQE) Program at each contracts center. Each program will be patterned after the PIQE Program implemented at our Houston Center, and tailored to the customer's desires.

2a We propose to establish a Division-wide PIQE Council chaired by an Applied Technology Division (ATD) vice president.

ACCOMPLISHMENTS:

1b The major benefit realized from this action was the refining of current processes and establishing of new processes for measuring quality and productivity achievements, based primarily on the Oregon Matrix approach.

While a significant portion of the anticipated benefits identified in our original actions was realized, our original PIQE Program did not have the necessary common thread for successful implementation throughout the Applied Technology Division (ATD) because of the wide diversity of technologies supported. We, therefore, established a new process identified as the ATD's Quality Improvement and Productivity Improvement Process (QIPIP).

The Division policy of Quality was established in September 1987. Our policy reads as follows:

"It is the policy of the Applied Technology Division to satisfy the needs of our clients for defect free products and services by performing consistent with announced and fully understood requirements."

We developed a broad new Quality Improvement and Productivity Improvement Process for implementation on each of the division's field contracts, and by October, had presented the new process to the CEO's task team and to a meeting of all division contract managers, center directors, and regional vice presidents. The objectives of our new and revised Quality Improvement and Productivity Improvement Program are as follows:

- To initiate a top-down, formal, people-oriented process which will be applied throughout the division at appropriate organizational levels.
 - To communicate to ALL CSC/ATD employees management's position on Quality and Productivity Improvements.
 - To facilitate understanding of the concepts of QUALITY MANAGEMENT and each employee's role in implementing the techniques to cause a CULTURAL change in the way the division looks upon QUALITY/PRODUCTIVITY.

- To intensify the spirit of PRIDE IN THE WORKPLACE for all employees, and recognize those employees that make the difference...that make it work.
- To reduce the overall cost of doing a quality job.

To date, we have initiated pilot programs at three of our field centers and have supplemented the QIPIP with a revised Employee Recognition Program called "ATD's PRIDE." Our PRIDE Program was introduced to senior division management (contract managers, center directors, and vice presidents) at our annual Center Director's meeting in September 1987 with the presentation of employee recognition awards by the division president.

2b The commitment to action to establish a Division-wide PIQE Council chaired by a vice president has been deferred temporarily, pending the completion of several intermediate actions which became necessary as our quality program requirements were refined and better understood.

Organization: COMPUTER SCIENCES CORPORATION—SYSTEM SCIENCES

DIVISION

Contact: Dr. Arturo Silvestrini, President

Address: 8728 Colesville Road

Silver Spring, MD 20910

COMMITMENT TO ACTION:

The System Sciences Division of Computer Sciences Corporation (CSC) is fully committed to continuing and building upon its existing formal program of Productivity and Quality Improvement. The action to be taken is to continue expansion of our computer software development environment with automated development techniques for increased accuracy and quality with an attendant increase in productivity.

System Sciences Division (SSD) is continuing its long-term program to provide the environment, tools and methodologies to ensure that the software and systems we provide to NASA (and all of our clients) are of the highest possible quality and are produced cost-effectively. The approach we outlined in Commitments to Action published in May 1987 by NASA is to "expand our use of methods, new tools, workstations, and reusable software in an environment that encourages innovation and achievement" and by "providing corporate-wide policies, standards, training, and the improvement of the quality of worklife."

ACCOMPLISHMENTS:

During the past year the expansion in the use of workstations within SSD continued with an increase of over 62 percent in the number provided during the year. Workstations are now provided to over one out of three technical staff members. The long-term goal is a ratio of 1 to 1.

Methodologies, such as our Digital Systems Development Methodology (DSDM), are being continually fine-tuned to more fully integrate the management and technical aspects of systems development aimed at elimination of errors and rework through keen attention to life-cycle requirements during the analysis and design phases. In a major new project called Systems Engineering, Analysis, and Support (SEAS), awarded to SSD by Goddard Space Flight Center (GSFC), we are developing and will use a SEAS System Development Methodology (SSDM) derived from our DSDM, and specifically tailored to the SEAS environment.

One of the most effective methods of increasing software development productivity is to reuse existing software designs and codes; SSD has achieved considerable success with this approach. Structured development techniques and complete documentation (DSDM precepts) produce software that can be reused more easily. The amount of software reuse achieved on projects ranges from 10 to 80 percent, with the average being about 30 to 40 percent. Because the quality is proven, reused software translates directly into cost savings for NASA as well as the obvious improvements in reliability and confidence.

In phasing into SEAS, the largest contract awarded to CSC so far (over \$1 billion value), we are providing training to the more than 1,100 project personnel to ensure that we continue the commitment to quality and productivity that has characterized our work for NASA. The SEAS training includes program orientation, project control tools, analyst workstations, quality and productivity awareness, and task-specific technical subjects. In

overall Division training during the year, over 1,600 people participated in the various programs offered in management, administrative, and technical areas (there are just over 1,700 people in the Division).

Participative programs such as SSD's suggestion system, Ideas Into Improvements (I³), continued by implementing several suggestions and provided awards to 10 percent of the participants. SSD's program of Special Interest Groups (SIGs) continued; these SIGs are core groups of dedicated individuals who maintain and sharpen skills in specific technology areas such as artificial intelligence, office automation, data base management systems, software engineering, and user/computer interfaces. With over 450 participants last year, the SIGs help to provide a ready means for cross-fertilization of ideas among projects.

In addition to the I³ suggestion program, the Division provides rewards in the form of incentive and bonus arrangements for employees who are responsible for success. Last year these awards were shared by 463 employees of SSD (27 percent of the average full-time employees for 1987).

BENEFITS:

As a result of the continuing drive for excellence in all areas of performance, SSD projects were recognized by NASA/GSFC with many letters of commendation and a continuing high level of performance evaluations on our award-fee contracts.

The upward quality and productivity trends we are experiencing are significant. For example, software development productivity has tripled since 1983 through improved quality and the development of reuseable software modules. The use of automated workstations in the analysis and design process has had a profound effect on the up-front quality of the software systems. The costs of requirements analysis and design have not increased while the quality of those products has; and because of that quality increase, the costs of coding and testing have decreased substantially. Significantly, there has been a reduction in the number of requirement errors and design problems found during the testing phases, and the delivered products have higher quality. Because the errors are found early in the internal development process, few errors are delivered to users. SSD's delivered error rates, which were low to begin with, have been cut in half in the same time that productivity has tripled.

SUCCESS OF APPROACH:

The commitment to quality and productivity improvement is long term and one which continues the actions that started over a decade ago at SSD. The formalization of methodologies, the use of software development tools, increased automation, and the training and participation of the staff in the program, are providing the benefits we seek: we will continue to improve the quality of our software, systems and services, and provide them cost effectively. At CSC, we recognize that these goals are critical to our future success.

Organization:

EG&G FLORIDA, INC.

Contact:

J. R. Dubay, General Manager

Address:

P. O. Box 21267

Kennedy Space Center, FL 32815

COMMITMENT TO ACTION:

EG&G Florida intends to institutionalize the productivity improvement process throughout all elements of the Base Operations Contract at Kennedy Space Center.

ACCOMPLISHMENTS:

EG&G Florida's successful approach to the institutionalization of the improvement process is attributed to our "Team Approach": (1) demonstrating strong top management involvement and support and (2) maximizing the contributions of the organization at large.

Top management involvement and support has been continually demonstrated through such means as:

- Providing highly visible top-management commitment to quality and productivity improvement.
- Establishing annual improvement goals.
- Monitoring improvement goals and providing wide visibility of results.
- Committing resources to support improvement efforts.
- Integrating quality and productivity improvement into the long-range planning process.
- Developing annual reports that focus on accomplishments of the various functional elements.
- Establishing quality and productivity improvement as an important element of the performance evaluation process.
- Reinforcing improvement through various reward systems.

Contributions of the organization at large have been maximized through employee involvement processes such as:

- Employee Suggestion Program
- Quality Circles
- Productivity Working Groups
- Work Simplification Teams
- Productivity Councils
- Employee Surveys
- Task Forces

Organization:

FAIRCHILD SPACE COMPANY

Contact:

Martin N. Titland, President

Address:

20301 Century Boulevard

Germantown, MD 20874-6219

COMMITMENT TO ACTION:

Revise our customary product development process by delaying design release for production until engineering has completed full prototype qualification testing. Institute periodic in-depth design reviews by internal peer groups. Architect the product to serve a wide variety of applications and provide for ease of technology insertion as improved technology becomes available. Used advanced packaging and manufacturing technologies and automated design tools.

ACCOMPLISHMENTS:

The timeframe of our effort is intended to cover a medium timeframe of 3 to 5 years. Fairchild Space Company has made excellent progress during the first year of the program.

The IR&D program for a Solid State Recorder has been initiated. The Preliminary Design Review was successfully held during February/March 1987. All electrical designs have been simulated on CAE workstations to verify hardware design. One benefit of the use of the CAE was realized in the design of the direct memory access controller of the Solid State Recorder. It was possible to determine the physical scale of the design and to develop an alternative approach which utilizes VLSI technology and resulted in a 20 to 1 reduction in the number of parts.

One of our stated objectives to design for ease of technology insertion has proven successful. The use of surface mount technology has been incorporated in the design, as has the use of high density VHSIC packaging technology for the memory cards. We expect both to be demonstrated as part of a space flight experiment opportunity within the next year.

Material procurement has been initiated. During the next year we expect to conduct the Critical Design Review and manufacture, integrate and test the Solid State Recorder Design Development Unit.

An additional activity has been added to our 1988 program to automate the process of generating manufacturing documentation/fabrication aids directly on a workstation using CAE design information. We anticipate that this capability would also minimize errors and increase productivity.

We believe we have demonstrated efficiencies inherent in the automated design tools we are utilizing. In addition, the design allowance for technology insertion has ensured a product which will maintain its capability and provide future benefits to our customers.

Organization: GENERAL ELECTRIC COMPANY—ASTRO-SPACE DIVISION

Contact: E. T. Wojciechowski, Director of Productivity and Business Planning

Address: P. O. Box 800

Princeton, NJ 08543-0800

COMMITMENT TO ACTION:

Implement a Quality and Management Improvement process aimed at improving the performance of our people and the quality/performance of our products and services.

Overview: Astro-Space's commitment to improve the quality and productivity of its people and products is a long-range commitment (not a program but a continuing process).

This process has two distinct approaches consisting of the use of capital investments for facilities and tools, computers, test equipment, machinery, etc., to simplify work and improve product quality and lastly, to pursue more effective and efficient ways of doing our everyday tasks and assignments.

We at Astro believe that productivity and quality must start at the top and flow down to everyone. To this end, we try to instill an attitude at all levels that management is not only interested in productivity, but that management expects productivity initiatives from all our people and no initiative is too trivial.

ACCOMPLISHMENTS:

- Productivity and Quality improvement initiatives are reviewed and discussed at Astro-Space Division management meetings.
- Normalized macro productivity indices of total cost productivity and contributed value per employee are tracked and reported to corporate management on a quarterly basis.
- Astro-Space tracks and reports monthly on Repair/rework hours as a percentage of productive labor manufacturing hours, value of scrap as a function of productive direct labor manufacturing hours and total value of scrap.

BENEFITS:

- Most significant is a growing awareness by Astro people of the need to seek continuous improvements in the quality of our products and the way we work.
- The tracking and prompt analysis of our scrap with associated cause and remedial actions and subsequent disposition has resulted in reducing value of scrap by 27 percent in 1987 over 1986.

Organization:

GULFSTREAM AEROSPACE CORPORATION

Contact:

Robert K. Smyth, Vice President, Flight Operations/Quality Control

Address:

P. O. Box 2206

Savannah, GA 31402-2206

COMMITMENT TO ACTION:

Gulfstream Aerospace has embarked on a company-wide Quality Improvement Process. With the aid of an outside consultant group, we are beginning an educational process which is intended to change the quality culture of the entire organization.

ACCOMPLISHMENTS:

Gulfstream Aerospace Corporation launched its Quality Improvement Process (QIP) in March 1987. Our most significant achievement during the 10 months that followed has been a solid commitment on the part of management and a company-wide awareness of the benefits of quality improvement.

Our approach to QIP has been in two overlapping phases. We started with an outside consulting firm which had been working to improve our manufacturing efficiency for about a year. They knew our operation and they knew where opportunities for quality improvement existed. We entered a contract with them to implement a QIP in the Manufacturing and Quality areas. We stipulated that it must show near-term results and also marry up with the process begun a year earlier by our parent corporation in Detroit.

It wasn't long before we found that quality improvement in the manufacturing process was a wider corporate issue. It involved facilities, training, tooling, engineering discipline, and other less tangible items such as management perception of quality and schedules. We still went after the "quick hits" to justify our efforts and to show that modest initiatives generated with employee participation could make significant changes in the efficiency of our work. A number of positive achievements were recorded.

The process has evolved into the longer term QIP of our parent corporation. This involves a thorough educational program for every employee in the company, top to bottom. The magnitude of this effort dictates a multiyear timetable. Our officers have received executive-level QIP training and our directors and managers are receiving 1-week courses to equip them to function as Quality Improvement Team members. All salaried and hourly employees will begin appropriate training in the near future.

While the training process is underway we will continue to bring QIP techniques on line. We will be measuring the price of nonconformance and tracking our progress as we improve. We will introduce a system of prevention which will create a mechanism to remove impediments from getting it right the first time. We are embarking on a recognition program to reward in some tangible way those who facilitate the process. We are taking a longer view than we did a year ago, but our aspirations are even more positive. As they say, "QIP is not a destination, it is a journey."

Organization: HERCULES AEROSPACE COMPANY - AIRCRAFT AND

ELECTRONICS PRODUCTS GROUP - SIMMONDS PRECISION

Contact: W. T. Homewood, Vice President, Product Assurance

Address: Panton Road

Vergennes, VT 05491

COMMITMENT TO ACTION:

Product Support Task Teams consisting of Quality, Design, Industrial and Manufacturing Engineering personnel will be chartered to actively pursue ways to improve quality and productivity (Qualitatively).

ACCOMPLISHMENTS:

Simmonds Product Support Task Teams have achieved success in increasing product quality while improving productivity on our Vergennes, Vermont based Space Programs. The following changes in hardware, procedures or test equipment were made resulting in a reduction in scrap and rework giving us a lower cost, more reliable product:

- New handling fixtures are now being used during final assembly of the PRSA Gaging System Signal Conditioner. This has eliminated damage and rework to the cable assembly.
- A card tester was built allowing In Process Board Sub Assembly Testing to be performed. This has saved a considerable amount of Final Assembly rework and test time.
- A process and hardware change was made on our box housing and cover tearband hermetic seal which has reduced rework and increased product integrity.
- A new, more detailed glass to metal seal process procedure was developed and qualified on our OMS Gauging System Probes. Rework after final assembly has been held to a minimum.
- A new soldering iron is now being used during repair and rework of Printed Circuit Boards. This new iron uses R.F. to hear the tip which reduces the chances of heat damage to the board during rework.

BENEFITS:

Product Support Teams have been very successful in reducing costs of nonconformance. In 1987, through November, scrap costs, expressed in dollars, have been reduced by 31 percent over the comparable period in 1986. For the same period, rework costs have been reduced by 26 percent. Although not quantified, there has been a corresponding increase in productivity.

Organization: HERCULES AEROSPACE COMPANY—MISSILE, ORDNANCE

AND SPACE GROUP

Contact: Dr. P. Ward Hill, NASA Propulsion Manager

Address: P. O. Box 98

Magna, UT 84044-0098

COMMITMENT TO ACTION:

la Quality Improvement Process. The Missile, Ordnance and Space Group has initiated a quality improvement process based on the Phillip Crosby discipline supplemental with statistical quality control techniques. This is a total commitment by executive management and middle management with the objective of creating a new quality culture throughout the company. At this point, every manager, supervisor, and professional employee has received a minimum of 24 hours of in-class training. We are continuing with a minimum of 12 hours of in-class training for every exempt and wage employee. A complete hierarchy of planning, implementation, and auditing teams involving executive steering committees and working groups at all levels is conducting the process, which will continue as long as this company is operating.

2a Productivity Improvement Process. Hercules has just completed and put into service the first phase of an aggressive investment in motor manufacturing automation. This \$150 million plant incorporates the very latest in robotic materials handling, mixing, and casting operations with central computer control and data acquisition of process verification and quality control. We are committed to continue this process for all space propulsion products and operations.

ACCOMPLISHMENTS:

Ib Quality Improvement Process. The Phillip Crosby training courses were completed by all management and executive personnel. All operating personnel and staff were trained on site with 12-24 hours of specialized instruction. Steering committees and task teams are functioning to implement continuing training at monthly meetings for all defect prevention and corrective action systems, and quality incentive activities. The cost of nonconforming activity has been measured and reductions are already being observed. We are implementing a new culture requiring long-term effort and discipline.

2b <u>Productivity Improvement Process.</u> Our new automated propellant plant for the 1990's has been put into service and was instrumental in recent wins for Delta II and Titan IV booster motors. We are offering this experience as part of our contract to Marshall Space Flight Center for ASRM, and await procurement action by NASA for development.

Organization: HONEYWELL INC.—SPACE AND STRATEGIC AVIONICS DIVISION,

SPACE SYSTEMS OPERATIONS

Contact: Jerry R. Dangler, Director, Product Assurance

Address: 13350 U. S. Highway 19 South

Clearwater, FL 33546-7290

COMMITMENT TO ACTION:

Implement Space Systems Operations' Quality/Productivity Improvement Plans: Excellence Through Continual Improvement Program.

ACCOMPLISHMENT:

Honeywell has implemented an Excellence Through Continual Improvement Program (ETCI). The program involves all levels in the pursuit of improvement. Teams have been formed and are using process flow analysis to reduce cycle times, remove bottle necks, improve process flows and eliminate errors.

ETCI is in place at Honeywell, Space Systems Operations. The program is ongoing and planned to continue. We have started the intended actions, we have made significant progress, but we have much more to do.

BENEFITS:

Many improvements have been implemented and are achieving tangible benefits such as:

- Honeywell Inspection acceptance yields improved by 20 percent.
- Customer/DCAS acceptance yields improved by 20 percent.
- Reduction in total cycle time.
- Reduction in rework.

An intangible benefit from the program is an awareness of the importance and a commitment to performing quality work by all levels of employees.

ETCI has been successful to date. Improvements have been put into place that will yield future benefits.

A summary of status and activity applicable to the Space Shuttle Main Engine Controller program follows, pp. 22-27.





EXCELLENCE THROUGH CONTINUAL IMPROVEMENT

Objective:

a commitment to improve the way we do our jobs as a way of To foster an attitude of continual awareness of Quality and life for every team member

o Block I - Get ready to fly again

o Block II - Meet all technical, schedule and cost requirements





EXCELLENCE THROUGH CONTINUAL IMPROVEMENT

Supplier Program

Ensures a "teamwork" approach between Honeywell and twelve critical suppliers: 0

o Customized Picture Boards

o Designed for each Honeywell/Supplier Team

Displays company logos and pictures of Honeywell employees who use the 0

supplier's products in the assembly process

An enlargement of a letter is attached to explain where their products are held and emphasizes the need for teamwork 0

Quarterly Space Shuttle Program Newsletter

Keeps supplier personnel up-to-date with program activities

Highlights specific supplier accomplishments

Provides a forum for suppliers to communicate with the rest of the SSMEC team



Honeywell

EXCELLENCE THROUGH CONTINUAL IMPROVEMENT

- Newsletters are being published by all functional groups 0
- Block I Inspection yields are achieving the goal of 95% 0
- o Poster Boards and Photo Boards
- Located throughout the SSMEC office and assembly areas
- Maintains emphasis that "Quality is Number 1"
 - Shows program personnel at work
- Communicates program's goals and accomplishments
- o Developing a plan for periodic updates
- o Block II Production Layout Standardization
- All new layouts are standardized with word processed modifications for "assembly-unique" aspects 0
- operations to minimize the use of referenced documents Acceptance criteria is incorporated into the layout
- Production and Quality checklists are provided for operators and inspectors at strategic points within the layouts
 - Investigating ability of access Computer Vision System to match text with CAD graphics 0





EXCELLENCE THROUGH CONTINUAL IMPROVEMENT

- o Monthly Quality Awareness Meetings
- All functional groups participate including first line management

0

- Provides an organized approach to resolving long term issues that can improve the quality of our products 0
- An Action Register is maintained to ensure that the process and the commitments are well documented
- o Process Videotaping
- Initial phases of utilization
- Provides an excellent training tool
- Enables groups to view performance of a process and then provide feedback
- Helps ensure consistency, especially during long periods of nactivity 0
- Wave soldering of the Block II MIB will be the first process candidate for SSMEC 0





EXCELLENCE THROUGH CONTINUAL IMPROVEMENT

- o Process Flow Analysis (PFA) Activities
- Parts Procurement Process
- Begins with the generation of a Purchase Action Notice
 - Ends with certified material in the stockroom
- PFA Team meets weekly
- Functional chart generated with sequenced events and
 - elapsed time (currently 75 504 days)
- o 17 activities have been identified and a total of 10
 - functional groups are involved
- o Documented 9 out of 14 activities selected for
- documentation
- Expect to complete documentation phase by February 1988
- Analysis will be performed to scrutinize each task that s documented
 - Formulate recommendations from results of analysis
- Publish Final Report/Management presentation
- Initiate implementation of recommendations
- o Anticipated results based on other PFA Projects
- o Reduction in total cycle time up to 50%
- Reduction in process ("hands-on") time from 30% to 50%
- Reduction in rework time from 60% to 80%





EXCELLENCE THROUGH CONTINUAL IMPROVEMENT

- o Improvements realized to date
- Functional groups have a better understanding of the
- PFA has emphasized the need for more communications overall process 0
- Flexible enough to resolve problems on Individual activities based on where we are in the 30 unit procurement cycle
- Purchased Material Requirements Definition (PMRD) Automation 0
- Defines material quality requirements for procurement, source inspection and receiving inspection

0

- Automated using Multimate software
- Ensures total legibility and facilitates easy revision
- ASCI format enables us to transmit the PMRD as a file to Field Quality Reps via the Honeywell computer network
- As the network expands, the uses and advantages of having an automated PMRD will increase 0

Organization: LOCKHEED ENGINEERING AND MANAGEMENT SERVICES

COMPANY, INC.

Contact: R. B. Young, Jr., President

2400 NASA Road I Address: P. O. Box 58561

Houston, TX 77258-8561

COMMITMENT TO ACTION:

la Qualitative Goals.

a. Be and be recognized as a technical service industry leader in quality and productivity performance.

b. Be and be recognized throughout Lockheed as a leader in leadership development programs.

c. Provide contractor community leadership in involving NASA contractors in NASA quality and productivity efforts at NASA Johnson Space Center (JSC) including joint NASA/contractor training programs.

2a Quantitative Goals.

a. Win the 1986 NASA Excellence Award for Support Services.

b. Submit at least \$3 million in cost reductions to NASA.

c. Institute at least two contractor investment projects with cost sharing of customer savings from productivity improvement.

d. Complete development of the Lockheed Employee Team process and have at least 15 teams active on NASA contracts during the year. Participate in at least three joint NASA/contractor NASA Employee Teams.

e. Conduct at least two employee programs led by senior executives at each program location.

f. Provide Distinctions of Leadership or Distinctions of Coaching training to an additional 200 employees.

ACCOMPLISHMENTS:

Accomplishments against the committed actions from the 1986 Symposium on Quality and Productivity are summarized below. Goals are shown with related progress or results, as appropriate. Qualitative goals show progress, consistent with their being in context for action rather than a specification of outcomes.

Qualitative Goals.

- a. Be and be recognized as a technical services industry leader in quality and productivity performance. Results:
 - 1987 wins of major Government procurements totaling over \$900 million.
 - Lockheed did not compete for a large consolidation including a 450-person Lockheed contract. The work was transitioned to the selected contractor in an outstanding manner demonstrated by sustained excellent contract performance, excellent customer relations, excellent successor contractor relations, and excellent employee relations.

- Successful phase-in of several contractors' work involving over 400 people into a consolidated contract won by Lockheed under budget, ahead of schedule, and with excellent performance ratings in the first performance period.
- Participation in numerous technical, quality and productivity related conferences as organizers, panelists, presenters, and keynote speaker.
- b. Be and be recognized throughout Lockheed as a leader in leadership development programs. Results:
 - Personnel from four other Lockheed companies participated in leadership programs on a nonsolicited basis.
 - Key personnel were provided to lead the win of a major high-technology computer systems procurement for another Lockheed company.
- c. Provide contractor community leadership for involving NASA contractors in NASA quality and productivity efforts at NASA JSC including joint NASA/contractor training programs. Results:
 - The president of Lockheed Engineering and Management Services Company is the contractor community co-chairman for the NASA/Contractor Forum and NASA JSC.
 - NASA personnel have participated in several Lockheed training programs including enrollment in leadership development programs led by the Lockheed Engineering and Management Services Company (LEMSCO) president.

2b Quantitative Goals.

- a. Win the 1986 NASA Excellence Award for support Services. Selected as a finalist but did not win the award. Now competing for the 1987 award.
- b. Submit at least \$3 million in cost reductions to NASA. Verifiable cost reductions totaled \$5.1 million for FY 1987.
- c. Initiate at least two contractor investment projects with cost sharing of customer savings from productivity improvement. Discussions have been held with customer personnel resulting in an agreement in principle to use unearned fee to fund sharing of verifiable cost savings from contractor productivity investments. No mutually agreeable projects with unambiguous measures of productivity cost savings have been identified as yet.
- d. Complete development of the Lockheed Employee Team process and have at least 15 teams active on NASA contracts during the year. Participate in at least three joint NASA/Contractor employee teams. Sixteen teams were formally active on NASA contracts during the year and employees participated on three joint NASA/Contractor teams.
- e. Conduct at least two employee programs led by senior executives at each program site. At least one program was conducted at each site while others had more than two.

f. Provide Distinctions of Leadership or Distinctions of Coaching training for an additional 200 employees. Training was conducted for over 100 people during the period in accordance with revised training plans.

Competing for the 1986 NASA Excellence Award for Quality and Productivity served its purpose of strongly focusing attention on quality and productivity and being named a finalist is considered a success. Competition for the 1987 award has allowed continuation of heightened attention to quality and productivity. LEMSCO's overall goals performance, while excellent, includes apparent soft spots in productivity investment projects and training. Productivity investment projects as an objective are continuing, and implementation of initial projects is anticipated over the next few months. The softness in training resulted from conscious adjustments of goals and priorities to accommodate competing priorities.

Organization: LOCKHEED—GEORGIA COMPANY

Contact: L. A. Wilson, Director of Product Assurance and Safety

Address: 86 South Cobb Drive

Marietta, GA 30063

COMMITMENT TO ACTION:

Institute a program of total quality awareness and involvement for all employees in the Company. Use the concept of each employee being a "customer" and a "supplier" as work is performed in all functional organizations.

ACCOMPLISHMENTS:

In January 1987, the Lockheed Aeronautical Systems Company--Georgia began a program known as Total Quality Improvement Program (TQIP). One of the main elements of TQIP is total employee involvement. Employees have submitted, through their TQIP teams, over 3,000 suggestions, many of which have been implemented.

Each functional Branch prepared a program to ensure quality awareness on the part of each employee. TQIP is organized to promote functional Branch ownership. Each Branch has its own master plan, committees, and teams for implementation. Also, a Directorate, comprised of representatives from each Branch was established to coordinate and oversee the TQIP process.

BENEFITS:

We anticipate enhancing quality performance through the reduction of rejections, repair and rework. Employees have generated many innovations to processes in order to improve the quality of work. Following are several representative examples of quality improvement which indicate our anticipated benefits are being realized.

- 1. <u>Prescription for Quality</u>. Aircraft assemblies in the C-130 outer wing are tracked through the manufacturing process and any manufacturing nonconformances are recorded. Assemblies which receive no workmanship errors receive an "I'm Perfect-Don't Mess Me Up Down The Line" tag. As a result of this and other efforts, the Air Force Major Assembly Inspections were discontinued at the end of the third quarter.
- 2. <u>Automatic Paint and Process Line (APPL)</u>. Employees in the Paint and Processing Department developed an identification system for variation tags to ensure that parts and tags do not become separated during processing. The team realized a savings of 600 man-hours per week with the system.
- 3. <u>Statistical Process Control (SPC)</u>. A pilot program for SPC brought about a greater awareness of root cause identification of problems in the Fabrication areas. This management tool will continue to aid in the control of processes.

Organization: LOCKHEED MISSILES AND SPACE COMPANY, INC.

Contact: Robert L. Vaughn, Director LMSC Productivity

Address: 1111 Lockheed Way

P. O. Box 3504

Mail Stop: 0/10-04, B-101 Sunnyvale, CA 94088-3504

COMMITMENT TO ACTION:

A developed Two-Year Productivity Program plan describes continued building on framework and organization that was established during the first 6 years of Lockheed Missiles and Space Company's (LMSC) Productivity/Quality Improvement program's existence. The building process will help ensure that LMSC's competitive position remains strong in the future.

ACCOMPLISHMENTS:

Productivity/quality improvement is a never-ending and challenging process. It requires that management and the work force strive for the most effective performance possible. The Productivity Program is responding to that challenge and is undertaking an aggressive series of objectives by way of the 1987-88 Two-Year Plan. By its accomplishment, the program will have greatly enhanced its capabilities to encourage the submitting of innovative ideas.

The objective status that follows reflects the successful expansion of program services and capabilities achieved in 1987. Their accomplishment has brought about an immense increase in program dynamics and should continue to do so through year-end 1988.

The 1987 objectives exist as part of the Productivity Program's 1987-88 Two-Year Plan published and distributed in January 1987.

1. Objective 1: Execute the Productivity Program Two-Year Plan (1987-1988) that includes specific areas, actions, and programs to improve overall productivity at LMSC.

Summary.

Productivity Program effectiveness depends on work force participation. This year's efforts have proven to be most successful, since the program's inception, at gaining and recognizing work force participation. At year's end, the Program achieved 22.2-percent employee participation. The Program objective is 25 percent by year-end 1988. This work force participation rate is reflected in all statistical records. Cost savings totals at year's end are \$261,181,731; employee ideas submitted reached an all-time high of 1,149; the acceptance and approval rate for the year was 93.2 percent. This success is indicative of our increasing publicity and awareness efforts and is also reflective of the ever-increasing management involvement at all levels. This involvement has prompted an ever-growing attitude of productivity/quality improvement.

The Two-Year Plan execution is supplemented by frequent action item reviews on the part of the LMSC PIP Committee and the annual planning conference in the third quarter of each year. Concurrent with those planning and review efforts is the emphasis being placed on a young, but strong, Superior Quality Award Program. This is the first full year of the SQ Award Program and to date 42 employees, either as individuals or team

members, have been selected to receive the award. This program allows the opportunity to recognize those individuals or teams that are taking actions that dramatically effect improvement in end-product quality. This Superior Quality recognition effort and the closer interfacing with Manufacturing, Product Assurance, and Quality Assurance organizations will continue to be a high-priority action item for 1988.

Still yet to be implemented is "New Organization PIP Coordinators Training Course." This course is designed to improve the effectiveness of the coordinator and resultantly that coordinator's ability to assist management and prompt a fostering of greater rapport with members of the work force.

Objective 2: Develop LMSC capabilities and procedures to encourage new, innovative ideas at all company levels.

Summary.

The completion of office automation efforts in the first quarter of this year greatly enhanced the program's ability to emphasize ideas at all company levels, not to mention the increase in efficiency and effectiveness of the Program Office itself. This automation effort and its programming will continue to be evaluated throughout 1988 and upgraded as requirements are identified and needs arise.

In January, a new series of publicity efforts began, highlighted by the innovative new program posters which have proven to be the most popular and well-received posters the program has ever printed. The Quarterly "I'm Involved" Newsletter underwent a change in distribution which has proven very effective by getting the newsletter into the hands of more LMSC employees.

Supporting the increased work force involvement is a new "Idea Brochure" which was distributed to all employees in August. The brochure outlines, in basic terms, what to do and how to submit an idea for implementation consideration. Additionally, this brochure outlines a new procedural concept allowing a cost savings accrual system for small dollar cost savings that do not meet the minimum dollar amount requirements as currently specified in the Procedural Guidebook. Once the accrual total meets a specified total, the individual is then recognized and rewarded for the cost savings actions. We believe this new procedural concept will open the door not only for additional dollar savings, but, more importantly, will allow an even greater number of employees to become included in the program.

Objective 3: Develop more effective administrative control procedures for the Productivity Program.

Summary.

Effective administrative control of the program is essential to its success. Program growth rate continues at a rapid pace and a constant review of procedures takes place by the LMSC PIP Committee. These procedural review notations then become agenda items for the Program Annual Planning Conference held in the third quarter. Again, the office automation plays a key role in program administration particularly with the current rate of growth. All these actions combine to reflect that the program administration has a status of being responsive to management and the work force.

Objective 4: Emphasize the developed thrusts that provide heightened insight in the areas of productivity-quality improvement. 1987-1988 Program Thrusts:

- Productivity/Quality: The Equation for Excellence

- Improved Planning Processes=Long-Term Productivity Improvement

- Fully Integrated Productivity/Quality Improvement

- Organization Goals and Objectives: Roadmaps to Success

- Total Engineering/Manufacturing Interface: Gives Maximum Effectiveness

Summary.

- Program efforts around Productivity/Quality have increased greatly. Close coordination between PA and QA organizations has resulted in a specific point of contact being established in those organizations. The selection process for the SQ awards is now extended to include PA/QA personnel on the selection committee.
- Improved Planning Processes require improved communications. An improved interface with each division is allowing improved planning efforts to take place at all levels throughout the company.
- Fully integrated productivity/quality improvement efforts are taking place on a daily basis. Greater awareness by employees and total support by management has prompted significant team efforts throughout the divisions.
- The importance of Goals and Objectives is stressed throughout LMSC. The interfacing of productivity/quality into organizational goals is starting to take place. These objectives permeate all layers of organizational structure throughout LMSC.
- As alluded to previously, objectives reflect not only productivity/quality improvement efforts, but the imperative interfacing of engineering and manufacturing as well. The most notable example is a 1987 SSD objective of establishment of an engineering/manufacturing interface project (EMIP).

Organization: LTV MISSILES AND ELECTRONICS GROUP—MISSILES DIVISION

Contact: Fred C. Sheffey, Director, Administration and Program Support

Address: P. O. Box 650003

Dallas, TX 75265-0003

COMMITMENT TO ACTION:

la <u>Macro Measurement of Productivity</u>. Establish and monitor measurement of total LTV Missiles Division productivity; show impact of productivity changer on profitability.

2a <u>Productivity with Quality Teams (P/Q Teams)</u>. Establish problem-solving P/Q Teams in white collar areas as well as in production areas. These will be quality-circle-like teams but adapted to the Missiles Division environment.

3a Newsletter. Publish six issues of "Gettinginvolved," a productivity newsletter.

4a <u>Missiles Productivity Measurement System (MPMS)</u>. Complete implementation of the <u>Missiles Productivity Measurement System</u> which includes the following actions:

- Analysis of work groups mission, etc., through Input/Output Analysis
- Selection of measures critical to the mission of the groups
- Collection of data and reporting
- Improvement of processes and procedures

5a <u>Suggestion Program</u>. Continue emphasis and employee participation in Missiles Divisions suggestion program.

ACCOMPLISHMENTS:

Ib <u>Macro Measurement of Productivity</u>. A Guide to Macro Measurement of Productivity was prepared and distributed. The Finance and Productivity Departments cooperated to identify input categories appropriate for a total factor productivity ratio. Procedures have been established for the guarterly preparation of the report.

Evaluation. Much remains to be done to communicate the value of using the information provided by the Macro Measure of Productivity in the company's business planning.

2b <u>Productivity with Quality Teams (P/Q Teams)</u>. Six teams were formed around problems, were trained in problem-solving techniques, met weekly, and completed the analysis of their problem and made recommendations to management.

Evaluation. Enthusiasm was high among the people involved with teams. Communication lines were more open; a good training program was developed and all team members, facilitators, steering committee members, and first line supervisors were trained.

3b <u>Newsletter</u>. Increased productivity awareness, increased participation in the various productivity programs and better morale through better informed employees was anticipated and experienced.

Evaluation. Newsletter continues to be well received. Contents have focused on P/Q Teams, the suggestion program, productivity measurement and improvement activities throughout Missile Division.

4b <u>Missiles Productivity Measurement System (MPMS)</u>. The Productivity Office conducted briefings to explain the system and its benefits, provided assistance to work groups implementing the system, and publicized results through the newsletter and briefings.

Evaluation. Several groups have had much success with the MPMS, but much work remains to be done to communicate the value of the system to other work groups.

5b <u>Suggestion Program</u>. Publicity was given to individual award winners, and increased awareness of the program promoted through posters, bulletin boards, and the newsletter.

Evaluation. Number of new suggesters increased by 17 percent number of awards increased by 48 percent.

Organization: McDONNELL DOUGLAS ASTRONAUTICS COMPANY—

ENGINEERING SERVICES

Contact: Charles A. Jacobson, Vice President - General Manager

Address: 16055 Space Center Boulevard

Houston, TX 77062-6208

COMMITMENT TO ACTION:

To improve our competitive posture and to improve our customer satisfaction, we and our suppliers must increase quality and reduce costs through productivity improvements in our systems and in how we perform our jobs.

ACCOMPLISHMENTS:

A Continuous Improvement Council (CIC) has been operational for approximately I year and we can now start to assess its effectiveness. The CIC meets weekly in an "open forum" and all employees are encouraged to participate in Continuous Improvement Teams which are formed to address issues as they arise.

BENEFITS:

Many issues have been resolved by the CIC and the benefits are now being realized. They include the following:

- Development of a fiscal training program for all employees to orient them to "the bottom line" end of the business. Employees have received three of six planned training modules of instruction to date.
- Establishment of a new department to focus our proposal writing technology and reduce costs associated with developing proposals.
- A smoking policy has been established and is now in effect. We have plans made to attain a smoke-free work environment during calendar year 1988.
- Development of guidelines for employees to promote ethical time-charging practices.
- Development of a company image and customer contact plan to better understand our customer's needs.
- Procedures to combat billing delays which have caused cash flow problems in the past.

In addition to our CIC activity, we are encouraging our line organizations to form natural work groups to attest productivity, quality and effectiveness of our processes and products. The idea is to encourage employees to identify and resolve inefficiencies or other problems as a natural part of their job responsibilities.

PROBLEM:

A problem was discovered after the CIC was in operation for a few months: Action Items and Improvement Team due dates for recommendations had a tendency to "slip

through the cracks." As is common in a high-involvement/group approach to problem solving, accountability was lacking.

SOLUTION:

An issues tracking system has now been developed and is being automated and placed on the company's Management Information System. With the action items assigned and tracked via this system, we hope to see improved accountability and a faster implementation of the good improvement ideas.

Organization: McDONNELL DOUGLAS ASTRONAUTICS COMPANY—

HUNTSVILLE DIVISION

Contact: A. P. O'Neal, Vice President - General Manager

Address: 689 Discovery Drive

Huntsville, AL 35806

COMMITMENT TO ACTION:

McDonnell Douglas Astronautics Company--Huntsville Division (MDAC-HSV) executes its technical programs with an increasing emphasis on quality (doing it right the first time).

Continuous productivity improvement is attained through the systematic review of our procedures and processes to provide more cost-effective products and services to our customers.

ACCOMPLISHMENTS:

The Commitment to Action by MDAC-HSV was dedicated to realizing an increased emphasis on quality performance in the execution of the NASA Marshall Space Flight Center (MSFC) Spacelab Integration Contract.

- 1. The involvement of line management in Quality/Productivity enhancement was increased. Among the actions taken was the systematic review of all procedures for applicability to the division operations and processes.
- 2. Productivity plans were developed for each functional department that contained Missions Statements and Objectives linked the Division Mission and Strategic Objectives. In addition, they contained the approach for implementing a continuous Productivity Improvement process.
- 3. Training was extended to senior management and professional employees to provide leadership in improving personal productivity by establishing personal goals in support of divisional goals and more effective time management.

- 1. An integrated Data Base for all Spacelab Project action items was developed through the consolidation of several computer listings. This provided improved visibility of action-item tracking and more timely response to customer-assigned actions.
- 2. Substantial quality and productivity gains were made in the areas of Computer-Aided Engineering (CAE), Computer-Aided Design (CAD) and in the development of computer aided task planning.
- 3. Implemented a new system for Cable Assembly and Wire List Drawing preparation. Conservatively, the new system reduces the effort to prepare this type of drawing by one-third.
- 4. Using mainframe, mini and personal computers, well over 90 percent of all budgetary and cost-accounting functions were automated. Fiscal planning, review and evaluation has been enhanced by more complete and timely information.

5. Office automation efforts supported the successful Spacelab Recertification project by providing greater visibility and control of documentation. Data bases were developed in Safety, Reliability and Quality Assurance (SR&QA) and Materials and Process (M&P) with improved data utility.

SUCCESS OF APPROACH:

- 1. MDAC-HSV received performance ratings of Superior on both of the Spacelab Program award fee evaluations conducted during this period. While many other factors were involved, the most recent evaluation was the <u>highest</u> received since the beginning of the program in 1977.
- 2. Performance Measurement data was developed to determine processing times for a number of repetitive project tasks. This data was monitored in monthly project reviews to develop reference data to support project planning and indicate opportunities for improvement.
- 3. The Division-wide review of procedures has identified potential areas for process improvement tasks. Natural Work Groups (NWG's), the people actually doing the work, are engaged in these efforts. They exhibit enthusiasm for this approach.
- 4. The MDAC-HSV Quality and Productivity Commitment to Action is progressing in agreement with the timeframe (schedule) as planned. The results of these efforts are communicated in internal periodic reports and to NASA/MSFC Spacelab Payload Projects Office in Monthly Reports and Quarterly Program Reviews.

Organization: McDONNELL DOUGLAS ELECTRONICS COMPANY

Contact: Larry E. Hayes, Director, Manufacturing

Address: 2600 N. Third Street

P. O. Box 426

Saint Charles, MO 63302

COMMITMENT TO ACTION:

McDonnell Douglas Electronics Company (MDEC) has embarked on a process of continuous improvement utilizing employee idea-handling teams to analyze how we work and to suggest ways to eliminate inefficiencies in our existing organizations. Short-term goals required each team to define its individual suppliers, customers, and products. Improvements to eliminate problems and waste were to be defined and discussed with internal suppliers and customers. Barriers to improvement were to be identified and eliminated in an ongoing process of continuous improvement.

ACCOMPLISHMENTS:

The process of each idea-handling team analyzing how it functions with respect to its suppliers and customers was accomplished. The following chart was developed for a Production Engineering idea-handling team and is typical of charts developed by all teams. Analysis of this particular chart shows the various suppliers and their inputs to the idea-handling team and the outputs (products) of the team to its respective customers. The process of this analysis was very beneficial because it encouraged communication between different functional idea-handling teams, e. g., Engineering and Manufacturing, and enhanced a mind set to think of the "internal" customer and how important it was for each group to do it right the first time.

The above approach was successful from a short-range objective standpoint. In the long run it is anticipated that the existing idea-handling teams which are organized around specific functions will form the basis for the development of natural work groups which are multidisciplined. The embedding of the customer-supplier concept will enhance both the formation and function of natural work groups. The creation of natural work groups who "own" problems and seek continuous improvement will allow MDEC to achieve our significant business objectives associated with sales, ROI, etc.

BENEFITS:

There were tangible measurements of realized benefits. For example, some idea-handling groups documented significant savings. Several idea-handling teams associated with tool design, N.C. programming and machining collaborated to change planning and processes and effected cost savings of 23,000 man-hours in a 1-year period. Overall, our on-time delivery of end items and spares was in the high 90 percentile. Most significantly, we ended the year 1987 without a single delinquency of piece part spares. For the above and other accomplishments, we believe the approach of involving people more in their jobs and tapping the resources of an informed and involved work force is paying significant returns.

	SES	SES of dG	AG SES NG ENTS
CUSTOMER	TOOL/PROCESSESPROD CONTROLMAT'L REQMTSIND ENGRPWB PLANNING	QUAL ASSURTOOL/PROCESSESPROD CONTROLPROD PLANNINGIND ENGRPWB PLANNINGPROD ENGR	TEST ENGRDESIGN ENGRPROD PLANNINGPROD FLOORFACILITIESOUTSIDE CUSTMFG ESTIMATINGIND ENGRMFG MGMTPROG MGMTDCASR
PRODUCT	INDENTS	FLOW CHARTS	TECH SUPPORT-
MFG-04 GROUP			
DEPT 1711 INPUT	BLUEPRINTS OD DEFINITION "500" DEF OPER GUIDES FAB STRUCTURE	EFFECTIVENESS CORRECTIONS INSP GUIDES FUTURE ROMTS INFO	
PROD ENGINEERING SUPPLIER	DWB CONTROL DESIGN ENGR IND ENGR MANAGEMENT FAR PLANNING FA		

Organization: MARTIN MARIETTA—ASTRONAUTICS GROUP/SPACE SYSTEMS

COMPANY

Contact: John H. Bitzer, Director, Product Assurance

Address: P. O. Box 179

Mail Number \$4010 Denver, CO 80201

COMMITMENT TO ACTION:

Involve all organizational levels in improving achievements in productivity and product quality. Refine our existing measurement techniques to provide more accurate indications of Productivity and Product Quality "health status" and more explicit identification of "concern" areas.

ACCOMPLISHMENTS:

Two major actions have been initiated to provide further improvements in product quality and productivity.

1. A major effort to revitalize the operation's efficiencies has been launched and is called "Project Challenge." Project Challenge is focusing on several areas where enhancements are considered to be most beneficial, they include extensive use of CAD/CAE/CAM existing and new contract designs, application of the Manufacturing Resource Planning (MRPII) system in our Electronics Manufacturing Facility, use of an Integrated Scheduling System (ISS) and complete process simplification across all major operations.

A separate organization was staffed early in 1987 to lay out the necessary planning for this project and to guide its implementation throughout the company. Significant progress has been achieved:

- Planning and scoping of Project Challenge is complete.
- Pilot programs for CAD/CAE/CAM have been established.
- Pilot programs using MRP II in our Electronics Facility are underway.
- Pilot programs using the ISS are being implemented.
- The extensive job of process simplification has been scoped for 1988. One thousand processes related to production, business, design and management have been assigned for work. Early results are very promising.
- A training program has been initiated and will involve approximately 6,500 employees during 1988. The training covers all facets of Project Challenge and will provide teams and coaches for the long-term task of process simplification.

Martin Marietta Astronautics Group management considers "Project Challenge" to be the key to the future for all operations. The 1988 achievements will be reported in support of NASA's continuing QPIP.

- 2. In conjunction with "Project Challenge" and the NASA Quality and Productivity Improvement Programs, the NASA Systems Product Area has initiated action to refine existing measurement techniques. The following status identifies our progress to date and results achieved.
- Measurements. A system of measuring key operations had been developed and is nearing full implementation. A wide range of functions indicating the health and trends of productivity and quality are included along with indicators that reflect the benefit of improvements in each area.
- Benefits. Results of our action are starting to materialize in all areas. As an example, we used the Pyrotechnic Initiation Controller (PIC), a Johnson Space Center contract, to demonstrate the effect of productivity and process improvement on unit cost. The following approach was utilized:
 - * A productivity team was established to review manufacturing and inspection operations, the methods involved for each fabrication step, time standards for each operation, sequencing of inspections, solder process yield, rework cost history, and defects per unit.
 - * Unit defects were analyzed to determine the most common defects and the operation(s) where the defect was introduced.
 - * Statistical process controls were established for the soldering operation.
 - * All defects were reviewed for a second opinion to determine validity.
 - * Twice weekly reviews were held by the team to brainstorm ideas, review accomplishments and assess effects of changes.

The results were gratifying; changes in units solder, related hours and defects are as follows:

Costs "Manufacturing" Hours Per Unit	3/1/87 6.5	$\frac{12/31/87}{3.9}$
"Quality"	3.75 10.25	$\frac{2.75}{6.65}$
Total Reduction	<u>3.6</u> Hours	<u>35</u>
Defects		
"Total (per Unit)	80	47
Common Defects (per * Dewetting * Excess Solder * Hole in Solder Tot	5.9 2.5 <u>3.5</u>	2.7 .3 <u>1.7</u> 4.7 = 60%

These results are verifiable in the profitability of the contract. Continuous process improvements will be incorporated through the use of statistical process control.

- <u>Productivity Teams</u>. In late 1986, a team consisting of members from the various organization levels within the NASA Systems Product Area was organized to guide the overall productivity and quality improvement effort from an employee perspective. The team has been active in establishing increased employee awareness and participation through an employee of the month program and awarding incentives for suggestions.

BENEFITS:

Our overall program is working well. As demonstrated above, verifiable benefits are being realized and we expect even greater gains in 1988.

Organization: MARTIN MARIETTA MANNED SPACE SYSTEMS

Contact: R. M. Davis, President

Address: P. O. Box 29304

New Orleans, LA 70188

COMMITMENT TO ACTION:

Systematically modernize and upgrade plant facilities and equipment, emphasizing replacement with state-of-the-art technology and energy efficiency methods.

ACCOMPLISHMENTS:

- 1. The implementation of the Five-Year Equipment Plan and Machine Shops Productivity Upgrades Plans are ongoing and on schedule. In FY 1987, over \$11 million worth of new and replacement equipment was procured and the Machine Shop upgrading is approximately 75-percent complete
- 2. MAF utility expenditure commitment of \$2.8 million (25 percent) reduction through increased energy conservation was met and surpassed by 2 percent.
- 3. Negotiated a reclassification of the natural gas agreement with local utility service resulting in reduced natural gas rates.
- 4. Five Year Energy Conservation Plan has outlined six candidates which have been initiated to reduce utilities which include (a) power factor correction actions, (b) optimize chiller/Air-Conditioning Operation, and (c) high-efficiency motor replacement.

- 1. Significantly improved flow of work through the shop with many manual operations eliminated through automation. (Example--Installation of a Metlsaw computer-controlled nonferrous plate saw reduces sawing time by 50 percent.)
- 2. Assisted in minimizing the NASA FY 1987 funding limitation for the External Tank Project.
- 3. Projected annual savings of approximately \$1 million.
- 4. Projected annual savings of \$282,940.

Organization: MARTIN MARIETTA MANNED SPACE SYSTEMS (CONTINUED)

COMMITMENT TO ACTION:

Improve engineering design and development through optimum computer and software utilization, including the integration of Computer Aided Design with Computer-Aided Engineering(CAD/CAE).

ACCOMPLISHMENTS:

- 1. External Tank (ET) data base load -- provided an operational 3-D CAD data base for most ET flight hardware.
- 2. External Tank CAE pilot project -- evaluated the integration of CAD/CAE using existing hardware. The project was undertaken to develop and demonstrate the capability to integrate the design and analysis functions. The overall goal was to develop a prototype operating environment using the Computervision (CV) and VAX computers.

Evaluation results - (a) A high speed multiuser is required for timely file transfers. The link used in the ET CAE prototype system is inadequate for implementation. (b) NASTRAN, PATRAN and CV were the only systems involved. Further investigation is required to interface these with thermal and other analysis programs. (c) CV, PATRAN, and NASTRAN interfacing needs additional evaluation to determine full capabilities and/or limitations. (d) Configuration control of data for the design/analysis integration environment needs to be addressed.

NOTE: A CV CAD STATION was acquired to utilize the ET CAD data base in the preparation of flight readiness review material. Expected operational in early 1988. Text/graphic data to support management decisions and reviews would be a benefit.

3. Evaluated the application of electronic scanning to CAD loading of 2-D drawings.

- 1. The CAD data base provides a configuration controlled design capability that allows changes for most ET flight hardware to be accomplished electronically. The data base is also used to support automated machining of parts and is the basis for future uses of electronic drawings to support manufacturing activities.
- 2. Files transferred electronically from the CV to the VAX can interface to NASTRAN for analysis and/or PATRAN for pre- or post-processing of models. VAX files also can be transferred to CV for graphic visualization of analysis results. A menu-driven environment provides for integration of the design/analysis process and ensures all users access to the most current version of software.
- 3. Results indicate that transfer of remaining ET flight hardware, tooling and facilities layouts to CAD using scanner technology was cost effective. Efforts to acquire a scanning system are underway.

Organization: MARTIN MARIETTA MANNED SPACE SYSTEMS (CONTINUED)

COMMITMENT TO ACTION:

Maximize our human resources through employee-management involvement and commitment to our tradition of Mission Success while maintaining the highest ethical standards at both Martin Marietta Manned Space Systems and its suppliers and subcontractors.

ACCOMPLISHMENTS:

- 1. The System Refinement Teams (SRT) process experienced a significant impact through post 51-L work shift reductions and work area assignment changes. This resulted in a reduction in the number of teams (100 to 48) and Michoud participation rate (21 percent to 13 percent). With continued support by management and a strong commitment to the SRT process on the part of the employees, the number of teams have increased to 85 with a Michoud participation rate of 23 percent. Five hundred and forty employees were trained to support the team increase.
- 2. Continued Employee Suggestion System.
- 3. Continued Zero Latent Defects Program.
- 4. Social awareness presentations were made to employees at 16 major/critical subcontractors. A Mission Success Subcontractor Conference with 200 subcontractors, NASA and our management staff is scheduled for January 1988.
- 5. Employees and management (540) were trained in "study the work--improve the work" methods, participative management, problem-solving techniques and approaches to improved teamwork.
- 6. Thirty-seven percent of the work force was recognized and presented meaningful, performance-based awards for their contributions to safety, quality, productivity, reliability, and cost reductions.

- 1. One hundred twenty-eight projects have been initiated with 54 of these completed. These contributed to improvements in quality, safety, cost reductions and productivity. Additionally, the motivation, morale, communication and development of those participating were improved significantly.
- 2. The employee suggestion system provided an effective channel for 39 percent of the work force to submit 386 safety recommendations, 1,072 quality and productivity suggestions, and 15 cost-saving ideas. The quality of the recommendations is reflected in the adoption rate of 38 percent, with 607 recommended improvements adopted.

- 3. The motivation and opportunity provided to employees through this program helped surface and resolve 508 in-process latent defects, preventing their carryover to a post delivery status.
- 4. Attention to quality and flight has improved.
- 5. This training contributes to the performance work system improvements, improved work knowledge and skills application, and helps reinforce the overall emphasis on Mission Success.
- 6. The recognition has provided a continued work force focus on mission success with verifiable and measurable contributions that are substantiated through department and personnel records.

Organization: MARTIN MARIETTA MANNED SPACE SYSTEMS (CONTINUED)

COMMITMENT TO ACTION:

Improve and optimize manufacturing methods and processes, including extension of this action to our major subcontractors/suppliers.

ACCOMPLISHMENTS:

Since 1983, the technology transfer from Marshall Space Flight Center (MSFC) Productivity Enhancement Center has led to the development of the following projects for the External Tank (ET) manufacturing methods and processes.

- 1. Elimination of Super Light Ablator (SLA) from the ET Aft Dome with the implementation of NCFI 22-65 Spray-on Foam Insulation (SOFI) and development of NCFI 23-65 SOFI for sidewall application.
- 2. Development of Reaction Injection Mold (RIM) process to apply PDL 4034 foam to the protuberance, ice/frost ramps.
- 3. Variable Polarity Plasma Arc (VPPA) weld process for 2219 Aluminum Alloy, Circumferential Weld Tool Clamp System, and VPPAB & Weld Torch.
- 4. Development of single intertank spray.

- 1. The elimination of the SLA from the ET aft dome, enhanced safety of personnel (material contains Heptane and requires Class I, Division I Facility), but also allowed cells "C" and "B" (LH2 Barrel and Dome SOFI) to be configured to present and future rate per year capacity for LH2 tank thermal protection application without the need of cell "N" (LH2 SLA).
- 2. This automated process replaces the hand mix of foam and the hand pour into the various molds. Enhanced quality of the net molding ramps result from this process along with the following additional benefits: (a) pour size consistency for ET to ET due to constant metered shot size on each ramp, (b) reduced rework on ramps, and (c) reduced waste of material due to machine pour.
- 3. These specific technology transfers not only have realized many direct labor hour savings, but have also reduced rework (e.g. 50-percent reduction in weld defects). Additionally, the accumulated efficiencies of the TO5A5019 (LH2 Major Weld Tool) with these technologies increased the capacity to support a 24 ETs per year mission model without building a duplicate tool as was previously required.
- 4. This single-step process replaces a two-step foam application (Isochem) and a final automatic spray (CPR-488). This process improves the quality of the intertank foam and has the following additional benefits: (a) weight reduction of 193 pounds per ET, (b) Reduced labor of 785 hours per ET, (c) eliminates BX-250 for a \$10,400 saving per ET, (d) Eliminates acreage Isochem which increased confidence, (e) new tooling allows use of backup guns, and (F) eliminates drilling of vent holes.

The following technology transfers are planned for 1988:

VPPA Weld Process Backside Vision System.

VPPA Weld Process Torch Side Bead Profile/Seam Tracker.

Development of Composites for Secondary Structures. These lightweight, strong and reliable materials are being studied currently. The components offer an expected benefit of 40-60 percent weight reduction and a significantly reduced number of ET components due to the eliminating of small metal parts and the need for thermal protection material.

Organization: MORTON THIOKOL, INC.—SPACE DIVISION

Contact: John R. Wells, Director, Quality and Productivity Improvement

Programs

Address: P. O. Box 524

Brigham City, UT 84302-0524

COMMITMENT TO ACTION:

The present Space Division Productivity Improvement Quality Enhancement (PIQE) Program is being analyzed to identify areas of weakness where the development of new initiatives could lead to improved quality and productivity. The analysis has included a review of PIQE programs conducted by industry leaders. In addition, work shops and seminars structured to provide new ideas and insights have been and will be involved. At the completion of the analysis, a plan of action will be developed for implementing selected new initiatives.

ACCOMPLISHMENTS:

Considering the pressures associated with returning the Space Shuttle to flight, significant progress has been made during the past year in the PIQE arena.

1. Quality Enhancement Programs.

- Implemented a new "Quality Ambassador" (Quality Awareness) Program involving approximately 2,500 employees and allowing the alignment of individual employee goals with company goals.

2. Structured Producibility Effort.

- A Statistical Process Control committee was formed and a charter for implementation has been developed
- Manufacturing/Engineering Producibility Teams have been formed
- Working toward replacing operator sensitive operations with automation
- Implemented technical forum to communicate lessons learned among programs and to work common producibility issues

3. Employee Involvement Programs.

Total Employee Action Meetings (Team - Quality Circles)

- Increased opportunities for individuals and groups for growth
- Increased participation by 55 percent
- Introduced new techniques for documentation of projects, presentation, problem solving and leader and facilitator training
- Projected 3-year savings on 1987 projects is approximately \$2,620,000

Economic Awareness

- Implemented new, all voluntary education program
- Recruited and trained 10 volunteer trainers
- Conducted during nonwork hours

Technical/Skills Training

- Introduced new 40-hour preemployment training program
- Developed 60 workbooks (4-hour blocks) of operator training using area operators a subject matter experts
- Implemented formal "train the writer" and "train the trainer" programs
- New training for secretarial and clerical employees was evaluated and recommended by secretarial and clerical employees

Positive Results - Oriented Program

- Increased total suggestions to 1.41 per employee per year (43 percent safety, 18% percent quality and, 17 percent cost reduction)
- Projected 3-year savings generated from 1987 suggestions is approximately \$4,101,000
- 50 percent of suggestions are being accepted
- 90 percent of suggestions are being implemented

4. Professional/Management Development.

- Implemented a new Performance Planning and Development program (appraisal) in Space Operations (aligns customer, company and employee goals; encourages and rewards professional growth; and provides measures of personal performance)
- Expanded on-site graduate level education programs
- Developed and implemented 13 new management/professional programs (14 additional new programs will be online in April 1988)
- Developed and piloted a new management sensitivity training program in cooperation with Utah State University

5. Employee Recognition/Reward Program.

- Improved Superior TEAM recognition incentives
- Published a new Operations' newsletter, "Segments", and made monthly home mailings
- Provided a purchase program for NASA/MTI mementos
- Created a new "Safety Management Alert Right to the Top" (SMART³) program (16 employees recognized to date-\$500 bond)
- Evaluated and selected new vendors for awards
- Created automated tracking and reporting systems

6. Gainsharing.

- Research a wide variety of programs available
- Developed a custom-fitted program for Space Operations
- Customer/Company reviews process

7. Subcontractor PIQE.

- Developed a Manned Flight Awareness program to be presented to subcontractors
- Scheduled/planned our second Subcontractor symposium for April 1988
- Implemented a new vendor rating program
- Implemented a training program for subcontractors with a "Suppliers Guide"

JET PROPULSION LABORATORY

Contact: Dr. C. R. Gates, Associate Director

Address: 4800 Oak Grove Drive

Pasadena, CA 91109

COMMITMENT TO ACTION:

A program will be instituted involving the establishment of Quality Councils in key areas, supported by ad hoc Improvement Teams and by other activities designed to increase the extent and depth of participative management. The purpose of such a program is to instill an ethic of continuous quality improvement in the institution at all levels and in all areas.

ACCOMPLISHMENTS:

- 1. Quality Improvement Steering Committee. A Quality Improvement Steering Committee was formed composed of members of senior management. The membership consists of the Associate Director (Chairman), Assistant Laboratory Director for Administrative Divisions, and the Assistant Laboratory Director for Technical Divisions. The chairman of this committee is Jet Propulsion Laboratory's (JPL) official external representative on matters pertaining to quality and productivity, and the two Assistant Laboratory Directors are responsible for most of the staff at JPL. Another concept in the design of JPL's program is the formation of selected Quality Improvement Councils within the Administrative and Technical Divisions to direct and oversee the work of Quality Improvement Teams which are designated to work on specific issues and problems.
- 2. <u>Administrative/Technical Divisions Interactive Teams (ATDIT)</u>. A broad, inter-organizational team has been formed, consisting of the Administrative and Technical Managers, and co-chaired by the Assistant Laboratory Directors for the Administrative and Technical Divisions.

The ATDIT has evolved naturally from an annual retreat of this group, in which mutual problems were identified and corrective action undertaken. At the last meeting of this group, some 124 such problems were collected, and, after review, a set of issues dealing with ADP planning and acquisition was selected. Subsequently, a working group was created to develop specific recommendations for action.

- 3. Quality Councils. In the area of education and training, the training program for JETs (JPL Enhancement Teams) which is equivalent to NETs (NASA Employee Teams) was modified to include task team training for use by the Quality Improvement Teams. Thus, two techniques, i.e., volunteer enhancement teams and management-assigned task teams, will continue to be used in the future. One such task team is nearing the completion of its project as described in the following paragraph:
- 4. <u>Power Circuit Design Automation</u>. The JPL Electric Power Systems Section assigned a team the task of converting its circuit design process from manual to automated methods. The team has defined its circuit design needs, investigated appropriate hardware and software packages, and established a workstation for circuit design engineers to be trained and become efficient in using the automated system.

BENEFITS:

- 1. The Quality Improvement Steering Committee. The Quality Improvement Steering Committee, composed of three members of senior management, is responsible for the overwhelming majority of the JPL population. Program direction can thereby be implemented in the Administrative and Technical Divisions, with fall-out benefits to the other programmatic or smaller organizational directorates which have their work done through these Divisions on a matrix basis.
- 2. Quality Councils. The council formed to examine the problems of ADP planning and acquisition will have the ability to draw on knowledgeable personnel in the Administrative and Technical Divisions to work on the Improvement Teams which will examine three subcategories of the problem. Results are expected within the CY 1988 timeframe. The concept of intraorganizational management councils will enable various Division Managers to form Quality Councils and subsequent Quality Improvement Teams to examine internal processes and make improvements leading to higher efficiencies in operations.
- 3. Redirection of the Training Program. The JPL training program is now flexible in that volunteer enhancement teams or management-assigned teams can be trained either in a designated training facility or in a work area belonging to an assigned team.
- 4. Power Circuit Design Automation. The hardware and software configuration now in the final stages of installation by the Electric Power Systems Section demonstrates the advantages of automation. Once the procedural techniques are mastered by the power systems engineers, they will do more detailed analysis, in a faster timeframe, with much more confidence that the power circuits designed will be able to withstand electrical and temperature anomalies.

SUMMARY:

The JPL program has been organized at a level that has the effectiveness to implement a successful program. A training program is in place to help personnel to become aware of proven participative processes available for use. The enhancement teams and task teams will work problems and issues within local organizations. Quality Councils and Quality Improvement Teams will function on a wider base and handle problems and issues of an institutional nature. The program will be very selective with a gradual trend toward building improved quality systems into JPL operations as a way of life. Program results will be reported in the NASA Annual Accomplishments Report and in other documentation as appropriate.

LYNDON B. JOHNSON SPACE CENTER

Contact: Dr. R. Wayne Young, Deputy Director, Administration

Address: Code BA

Houston, TX 77058

COMMITMENT TO ACTION:

Broaden the scope of the Johnson Space Center (JSC) productivity effort to one of Team Excellence which includes all major performance areas including safety, quality/reliability, leadership, participation, quality of work life, productivity/efficiency, innovation and teamwork. Integrate Team Excellence with strategic planning, focus on key activities having the greatest impact on JSC's functions and missions.

ACCOMPLISHMENTS:

The strategic planning effort was initiated involving a broad cross-section of JSC employees. At the same time, the productivity effort was renamed Team Excellence and broadened to focus on enhancing key activities in all major performance areas. This dual approach has provided the groundwork for integrating Team Excellence and strategic planning; merging of the two efforts will continue with the implementation phase of strategic planning.

1. <u>Strategic Planning</u>. The JSC strategic planning effort was part of a NASA-wide planning effort being coordinated across the agency by the NASA Strategic Planning council. Purpose of the effort at JSC was to help the Center better understand future program requirements and determine what needs to be done now to prepare for the future.

The most visible product has been the publication of a JSC strategic plan covering five major areas of emphasis at JSC: (a) National Space Transportation System, (b) Space Station, (c) Advanced Technology Development and Utilization, (d) Institutional Excellence, and (e) Relationships with External Constituents. However, a more important accomplishment has been the teamwork fostered across the Center during the planning process—a process based on broad participation (rather than a top-down approach) with all levels involved, younger as well as more senior employees.

This participative process has enabled the Center to develop important data about a number of key areas: JSC strengths and weaknesses, new NASA initiatives and their requirements, and the need to strengthen JSC's technologies and capabilities for the future. The planning process also opened communication channels across the Center and throughout the contractor community and developed confidence that JSC can influence its future. Equally important, the effort developed a renewed appreciation of the need for a team effort by the entire U. S. Space team.

2. <u>Team Excellence</u>. Concurrent with the initial strategic planning effort, the Center has been implementing Team Excellence program aimed at integrating all of JSC's multifaceted enhancement efforts—whether originating as productivity initiatives, strategic planning initiatives, or technology initiatives. Under Team Excellence, JSC organizations identified more than 100 action items in six areas: human resources, improved methods, automation, new technology, contractors, and leadership. In addition to these individual organizational initiatives, the program included a structured six-step

process for in-depth organization or systems review and improvement, NASA employee teams (NETS), a JSC/Contractor Forum, and a pilot effort associated with technology and capability (T&C) planning.

In-depth review and improvement projects were initiated in a variety of organizational components; more than 500 civil service and contractor employees have been involved in these projects to date. For example, a project in the Center's Logistics Division involved both Government employees and the support contractor. Focus was on overall service improvement and teamwork, recognizing that systems improvements were essential if the division were going to successfully meet the joint requirements of the Shuttle and the Space Station.

Another in-depth improvement project was joint JSC/contractor effort between JSC's Mission Operations Directorate, Rockwell, and Unisys to streamline work processes and improve teamwork and communications associated with Shuttle Mission Simulator reconfiguration. A joint JSC/contractor task team was named to identify issues from which the project steering committee selected clarification of accountabilities and responsibilities as the first issue to be addressed by a joint NASA Employee Team (NET) made up of JSC, Rockwell, and Unisys personnel. This team developed a framework for identifying inputs, substeps, and outputs in the reconfiguration workflow and obtained input from all involved organizations regarding their perceived roles, responsibilities, and accountabilities in that flow. That input is currently under review by a second NET group tasked to identify problem areas and recommend solutions to the project steering committee. Major benefit from this joint JSC/contractor effort has been increased team spirit and cooperation focused on getting the job done better.

In a centerwide effort, the six-step process was also applied to small purchases procurement. A number of immediate "quick fix" improvements have already been implemented, and a substantial streamlining of the small purchases process is expected as that project is completed in 1988.

In addition to these efforts, NASA Employee Teams have been incorporated under Team Excellence with special emphasis given to joint NASA/contractor teams. In addition, a JSC/Contractor Team Excellence Forum cochaired by JSC and contractor personnel, is working toward enhanced NASA-contractor and contractor-contractor working relationships and addressing areas of mutual interest. The contractor community has been very active in the Forum; and working groups are exploring innovative contract incentives, opportunities for joint training, and productivity measurement concepts and techniques.

The improvement challenges coming out of strategic planning have already provided additional focus for Team Excellence. For example, procurement was identified as a key area for improvement; this supported selection of small purchases procurement as the Center's initial Centerwide Team Excellence Initiative. In addition, strategic planning identified technology and capability planning as an area requiring additional focus. As a result, the Structures and Mechanics Division initiated a technology and capabilities (T&C) planning exercise as a Team Excellence effort. The purpose was to pilot a T&C planning process aimed at developing a division plan for meeting JSC's future T&C requirements. As a result of this pilot, several partial T&C plans were prepared; and a number of lessons were learned that will be useful in modifying the T&C planning process for use in other areas of the Center. As the strategic plan is implemented throughout the Center, Team Excellence will continue to serve as the vehicle for integrating all enhancement activities into a comprehensive, centerwide effort aimed at making improvement "business as usual" at JSC.

LANGLEY RESEARCH CENTER

Contact: William L. Williams, Special Assistant for Productivity Improvement

Address: Code 111

Hampton, VA 23665-5225

COMMITMENT TO ACTION:

Establish at least one employee participation team to assist both Center and contractor employees in the analysis and computation function. It is anticipated that this effort will serve as a catalyst to the overall Quality Circle program at Langley.

ACCOMPLISHMENTS:

The action has been accomplished with the establishment of a Performance Action Team (PAT) in July 1987. Members are from Unisys, a support contractor, and from internal organizations of the Acquisition Division (AD), Analysis and Computation Division (ACD), Management Support Division (MSD), and the Research and Information and Applications Division (RIAD). The PAT is currently chaired by the head of the Purchase Branch. The Center Productivity Officer and the QC Facilitator also have been working with the PAT since its inception. The PAT met on an average of once a month during the rest of 1987.

BENEFITS:

The benefits are still being realized since the PAT is still in operation. The initial goals were to focus on various segments of the supply process as it affected our central scientific computing complex at Langley. Team members were properly identified from the supply and acquisition functions along with the ACD and Unisys users. The division Chief of ACD selected this area as one offering high potential for increased productivity since a variety of supply problems still existed with all concerned actively addressing the problems without significant progress in some areas.

To date, the PAT has been very successful largely because of the interaction of the members as a team. The following initial goals and objectives have been achieved:

- Awarding of annual contracts for specific supplies. (In the past, purchase requests for commodities such as computer paper or computer ribbons might be submitted on an average of six times a year with different vendors competing and a different quality of end product being supplied. Using a solid experience, these are now competed annually, which has slowly reduced paper work and strengthened vendor contracts.)
- Improved quality of supplies. (Bidding for a year's worth of computer paper is significant and attracts quality suppliers willing to work with you to exceed specifications if possible.)
- Improved communications with the manufacturers and vendors. (Examples exist of site visits to see our needs firsthand in selected areas which have improved the definition of specifications and the willingness of the contractors to improve their process and product for the larger contract award.)

APPROACH:

The method of delivery of the material has been examined and in some instances drop shipments have been initiated to be more timely. The experiences and successes in the computing area have triggered a review of other commodities such as lumber, movie film, and printing supplies to determine if annual contracts can also be established.

TIMEFRAME:

The framework for our initial PAT is also being studied as a possible model for problems identified by several divisions within the Management Operations Directorate. The intent is to secure user involvement together with the functional specialists such as within our scientific photography organization.

LEWIS RESEARCH CENTER

Contact: David J. Steigman, Productivity Program Manager

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Mail Stop 500-206 Cleveland, OH 44135

COMMITMENT TO ACTION:

To develop, implement and provide resources for a Center Productivity Improvement and Quality Enhancement (PIQE) Program, with participation and ownership by all levels of the organization.

ACCOMPLISHMENTS:

The PIQE Program at Lewis is designed to encourage the development and implementation of organizational improvements in a non-threatening, participative environment. It entails a deliberate effort to make significant gains in quality and productivity through planning, implementing, managing and assessing positive change. Accomplishments for 1987 include the following:

- <u>PIQE Planning</u>. A number of organizations at Lewis in such diverse areas as aerospace technology, engineering design, and facilities engineering mounted a concerted effort to identify initiatives which would improve quality and productivity within their organizations. Areas where new initiatives were developed and implemented include equipment upgrades, training, work environment, communications, policies and procedures, customer relationships, and many others. Accomplishments are monitored and assessed to determine any follow-on activities required.
- <u>Cross Directorate Thrusts</u>. Senior Staff has approved six PIQE Teams to look at initiatives which involve one or more directorates at the Center. Current efforts include quality and productivity incentives for contracts (Team recommendations approved for implementation January 8, 1988): contractor-integrated suggestion systems, safety incentive systems, moving and office space, performance appraisal, and research process support.
- Newsletter. In 1987, the first three issues of a new productivity newsletter "Working Smarter" were published as part of the Lewis News. The newsletter is published to keep employees informed about the many quality and productivity improvement efforts underway at the Center, and also features successful initiatives being used by other organizations.

BENEFITS:

Through the PIQE Program, the Center is able to provide a framework for commitment to continuous quality and productivity improvement at all levels of the organization. The program provides assistance to organizations striving to improve their organizational effectiveness, and communicates the importance of quality and productivity throughout the Center. Implementation of the program has been quite successful so far, and we are looking forward to even greater accomplishments next year.

GEORGE C. MARSHALL SPACE FLIGHT CENTER

Contact: T. J. Lee, Deputy Director

Address: Code DD01

Marshall Space Flight Center, AL 35812

COMMITMENT TO ACTION:

Assess the current productivity improvement program and impact the current plan with the assessment results into an improved strategic plan for quality and productivity improvement.

ACCOMPLISHMENTS:

The productivity improvement community was thoroughly screened. A proposal from the Virginia Productivity Center (VPC) at VPI is in the process of being accepted by the Marshall Space Flight Center (MSFC) Procurement Office. The resulting 6-month trial grant with two additional option years will be awarded to VPC in mid-January 1988.

BENEFITS:

Although the VPC proposal has not been implemented yet, the Center still has high expectations for realizing or even exceeding the original anticipated benefits.

APPROACH:

Based upon the review of the proposal and the experience of other organizations with similar VPC approaches, the expectations at MSFC of a successful approach are high.

NATIONAL SPACE TECHNOLOGY LABORATORIES

Contact: I. Jerry Hlass, Director

Address: NSTL, MS 39529

COMMITMENT TO ACTION:

Place increased emphasis on the need for both long- and short-range planning in support of the National Space Technology Laboratories (NSTL) mission.

ACCOMPLISHMENTS:

As a result of the initiatives undertaken at NSTL, consistent with this plan, several accomplishments are noteworthy. There has been a marked increase in the level and depth of planning at all levels of management and there is evidence of enhanced communication and information exchange. Both major contractors have been involved with NASA in the planning process and NSTL has developed an up-to-date vision statement as well as updated goals and objectives. This same initiative will continue and should result in finalization of an NSTL Strategic Plan within a short period of time.

NASA efforts in encouraging the development of measurement techniques and group problem solving have resulted in a further expansion of these efforts by both of our major contractors. Within NASA, a greater appreciation of measurement techniques and systems has been developed.

BENEFITS:

As a result of efforts to achieve better communication and the use of group problem solving techniques, management as well as the general work force are much more conscious of the NSTL mission and of those efforts that are necessary to see it accomplished. There is also a much greater appreciation on the part of managers of the perspective of others and of the problems faced by the work force. The use of task teams has not only enhanced communication, but has served to broaden the base of expertise related to some very complex issues inherent in the NSTL operation.

In summary, the NSTL approach has been thoroughly successful in accomplishing our objectives. We believe the initiatives will continue in various forms and expect to reap additional dividends as they are further implemented.

OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY

Contact:

Sharon C. Foster, Director for Institutions

Address:

Code RI

Washington, DC 20546

COMMITMENTS TO ACTION:

la. Office of Aeronautics and Space Technology (OAST) strategic action planning project coordinating with OAST center's strategic planning process.

2a. Aeronautical technology productivity improvement—wind tunnel testing.

ACCOMPLISHMENTS:

Ib. Program strategic plans were initiated within NASA Headquarters for the aeronautics and space programs. After a framework was established for each activity, the plans were expanded to the three research centers (Ames, Langley and Lewis Research Centers). Workshops were held with Headquarters, NASA centers, and industry representatives for the purpose of establishing an aeronautics and space program strategy. During these workshops, future NASA and OAST roles, missions, goals and objectives and budget outlooks were discussed. Additionally, under the space workshop, industry views, trends, forecasts and strategic plans were presented by corporate representatives. The aeronautics strategic planning workshop was held on February 3-5, 1988.

2b. This long-term program and the achievement of the action will not be known for sometime. The first quantitative data showing the effects of the improvements will not be reported before the end of the first quarter of FY 1989. This will be complementary to the wind tunnel revitalization program but not duplicative or contained within it.

BENEFITS:

- Ic. The top-down and bottom-up strategic planning workshops provided a good forum to discuss goals, objectives, and issues/concerns. The workshop promoted team involvement and team building, and made the research centers a partner in the strategic planning process. The sharing which took place was enlightening and led to a more realistic, achievable, and unified strategy. This team building has established the foundation and will cultivate the participative environment required for a successful program.
- 2c. The Wind Tunnel Productivity Plan has been developed and updated to indicate the specific facilities being considered. Currently, the facilities noted in the plan at each of the three OAST research centers are being monitored to establish baselines. Since several of the facilities being considered for the program are now undergoing productivity improvement modifications, base years for these facilities will be established by using prior year data. The other wind tunnels are operating and current performance data will be analyzed to determine the base year.

APPROACH:

Id. An outside consultant was not utilized to help develop procedures for maximum Headquarters and center involvement, as originally planned. The workshop concept

allowed for brainstorming and refinement of procedures. It also provided a forum for industry to share its experiences in a participative strategic planning process.

2d. A program plan has been established and three distinct phases have been identified: (1) identification of appropriate wind tunnels, performance measures, and baseline years; (2) implementation of improvements to wind tunnels; and (3) monitoring of wind tunnel performance after improvements are complete. Identification of the final set of wind tunnels along with their baseline year definitions will not be completed until late this spring. Implementation of the improvements has already begun and will not be complete before FY 1989. Monitoring of wind tunnel performance to determine productivity improvements will start in FY 1989.

OFFICE OF EQUAL OPPORTUNITY PROGRAMS

Contact: Dr. Harriett G. Jenkins, Assistant Administrator for Equal Opportunity

Programs

Address: Code U

Washington, DC 20546

COMMITMENT TO ACTION:

Establish and implement a series of skills enhancement opportunities for equal opportunity (EO) staff, that include strategic planning and application and functional leadership in a multicultural environment as well as other on-the-job training or academic experiences.

ACCOMPLISHMENTS:

During FY 1987, NASA's Office of Equal Opportunity Programs (OEOP) continued its efforts to improve the program management skills of the agencywide EO staff by providing training in a multicultural (M/C) approach to the management and implementation of NASA's EO programs. The training provided was designed to improve cultural literacy, to instill M/C philosophy in all areas of NASA EO and affirmative action (AA) programs and, thereby, to better advise and assist NASA's senior managers and capitalize positive EO and AA results achieved during the past 13 years. Greater M/C literacy is becoming a necessity as NASA and the Nation grow more culturally diverse and expand partnerships with the international technical community.

BENEFITS:

Three major activities were initiated this year to begin to address the above activity; two were training interventions. One, a NASA Symposium on EO and AA Programs, was held in February 1987 at which NASA EO personnel were introduced to the M/C philosophy and processes for implementing M/C EO and AA Systems Change Models. The second was a NASA EO M/C Training Conference held in August 1987 to provide the NASA and Jet Propulsion Laboratory (JPL) EO Officers and OEOP senior managers an opportunity to review more fully the M/C philosophy and to decide whether or not to adopt it as NASA's model for change.

Also in August, the Strategic Plans and Programs Division spoke to the OEOP staff about developing a framework for strategic planning to accomplish human resources objectives.

As a result of the training, a decision was made to adopt the M/C model, and an agencywide M/C task force was formed to identify optional training approaches, including training sites, that would allow NASA to systematically implement agencywide, M/C, EO and/or AA Education Programs. In November, the task force recommendations were presented and approved. The recommendations were that a task order contract be negotiated for the 3-year M/C, EO and/or AA Education Programs. This type of contract would provide NASA with the continuity and uniformity that is required to successfully develop and establish M/C model for change. A request for funds to support the continuation of this activity has been made.

Organization: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION—

OFFICE OF MANAGEMENT

Contact: M. Peralta, Associate Administrator for Management

Address: Code N

Washington, DC 20546

COMMITMENTS TO ACTION:

la Consolidate procurement requirements for Headquarters PC-compatible micro-computers and conduct a competitive solicitation. (Headquarters Information Systems and Technologies Division - Code NHT)

2a Develop an automated system to manage and track the excess property disposal process. (Supply and Equipment Management Division - Code NIE)

3a Fully implement a low-cost, effective program for a NASA Personnel Reinvestigation Program that meets standards of National Security positions at an affordable cost. (NASA Security Office - Code NIS)

4a Develop and implement an automated productivity measurement system for agencywide scientific and technical publications (Management Programs Office - Code NPN)

5a Develop an Institutional Environmental Management System (IEMS) in conjunction with the Facilities Engineering Division and Johnson Space Center. (Information Resources Management Office - Code NT and Facilities Management Office - Code NX)

ACCOMPLISHMENTS:

- 1b Code NHT Progress since December 1986. Worked with procurement office to prepare a viable requirements specification and evaluation criteria. Action now in procurement office.
- 2b Code NIE Progress since December 1986. The system is now under development and is expected to be implemented throughout NASA in the 1988-1989 timeframe.
- 3b Code NIS Progress since December 1986. Responses from NASA centers indicate that anticipated benefits are beginning to be realized and that the approach appears to be successful. Because the timeframe for achieving overall program objectives is long, we believe that it is too early to render a final opinion.
- 4b Code NPN Progress since December 1986. As part of NASA's program to satisfy the Office of Management and Budget Executive Order on Productivity, this activity just completed its first full year of successful data collection. This data will serve as a base year for measuring improvement as well as expected gains in both quality and timeliness.
- 5b Codes NT and NX Progress since December 1986. IEMS is currently in the definition stage at Johnson Space Center. The functional requirements have been developed and system design is underway. System development will begin in FY 1988. The project essentially is on schedule. Since the system is in the definition and development stage, it is too early to comment on the benefits and the approach.

Organization: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION—

OFFICE OF SPACE SCIENCE AND APPLICATIONS

Contact: Dr. Lennard A. Fisk, Associate Administrator for Space Science and

Applications

Address: Code E

Washington, DC 20546

COMMITMENT TO ACTION:

Improve interaction and communication between the Headquarters functional offices and the Office of Space Science and Applications (OSSA) program office in order to achieve agency/program goals and objectives.

ACCOMPLISHMENTS:

While the timeframe for accomplishment of this action is long, OSSA has made progress in this area. As a part of the OSSA reorganization, the position of Assistant Associate Administrator (Institutions) was established. The incumbent serves as the focal point for interaction with the Headquarters functional offices, and part of her responsibilities includes the identification and resolution of interface issues. In the first quarter of CY 1988, we will initiate a study, in conjunction with the Office of Procurement and the Comptroller's office, which focuses on the contract and grant process and ways in which the process may be implemented more expeditiously.

Another key element in the accomplishment of this action was undertaken at the agency level with the appointment of the Associate Deputy Administrator (Institutions). This position underscores a total agency emphasis on institutional and functional considerations. The weekly Institutional Staff meeting provides a forum for discussion of accomplishments, problems, and issues.

In the next year, we plan to continue the emphasis on the importance of good communications with the functional offices.

Organization: PAN AM WORLD SERVICES, INC.—AEROSPACE DIVISION

Contact: Francis L. Shill, Vice President

Address: 7315 North Atlantic Avenue

Cape Canaveral, FL 32920-3721

COMMITMENTS TO ACTION:

1. Plan A: Provide full opportunity for our employees to be involved in improving our performance toward Contract requirements.

- 2. Plan B: Develop our work force to recognize and strive for optimum standards of excellence in all work activity.
- 3. Plan C: Implement techniques which effectively evaluate our achievement of improved quality and efficiency of services provided.

ACCOMPLISHMENTS:

Plan A. Employee Involvement. Our objective was to expand our already significant efforts to involve an even greater number of our employees in problem solving and performance improvement efforts. At National Space Technology Laboratories (NSTL), participation on employees' teams has grown from 21 percent in 1986 to 33 percent today. Over 40 percent of our hourly personnel and 28 percent of salaried employees salaried participate weekly in team problem solving and goal-setting meetings. The number of active teams has grown at NSTL from 6 in 1985 to 20 presently active. The variety of teams active at NSTL consists of Employee Action Circles including a Management team of NASA/Pan Am people, and an intercompany team with BAMSI, one of our subcontractors at NSTL. At Johnson Space Center (JSC), Pan Am people are very involved in the Contractor Team Excellence Forum and the first quality circles, including an interdepartment team, have been established to build on the gains of Pan Am's ongoing Productivity Enhancement Program (PEP) at that Project. Also at JSC, Pan Am engineers developed a valid participative measurement system applicable to engineering and drafting work. A Performance Objective Matrix (POM) was implemented in these two groups with notable success. At JSC, \$234,000 in cost savings has been proposed as part of our Productivity Incentive Fee.

Our NSTL/Facility Operations and Support Services (FOS) Project has implemented several initiatives in the area of new technologies. One of the Pan Am managers chairs the ADP committee and has been instrumental in improving the computerization of maintenance activities at NSTL. We are modernizing several older milling machines with digital readout (DRO) equipment to maximize their efficiency without major replacement costs. We anticipate that the improvements to the lathes alone will reduce machining times from 30 percent to 70 percent. Our Medical Service group adopted new equipment to conduct physicals, resulting in more accurate work and a cost savings of some \$12,000 per year.

2. Plan B. Developing our Work Force. At our NSTL/FOS Project, an in-house self-development course based on the "Investment in Excellence" curriculum has grown rapidly. In 1986, we trained nine employees: in 1987, 19 employees, both hourly and salaried, completed the course. A Task Team is presently working on the issue of management morale and attitude. Training in skills and supervisory methods is very active at all our projects. JSC has trained 235 people with in-house resources on such

topics as hazardous waste disposal and asbestos removal, and 25 Pan Am employees attended various sponsored professional and technical seminars.

At Kennedy Space Center (KSC), Pan Am continues to support Lockheed Space Operations Shuttle Processing Project (SPP) activity by instructing and participating in a World Integrated Training approach to Shuttle processing and related support operations. At NSTL, the Management Action Team has collected data to develop a comprehensive training program center-wide for Government and contractor employees. Additionally, 34 employees from the NSTL/FOS Project have attended conferences and seminars, often making presentations and chairing panels at those meetings. Our Performance Teams often select training as one of their performance goals and thus contribute to the overall goal of increased training. Our Tuition Reimbursement Program at NSTL was extended to a larger group of FOS employees and we have already seen an increase of 1 percent over 1987 levels in the short time since this change was implemented.

Plan C. Techniques to Evaluate Achievement. I believe it is in this area that Pan Am World Services has been innovative and posted our greatest improvements. At JSC, five crews completed the first phase of our PEP program, establishing performance baselines and trending productive time based upon practices developed in our aircraft maintenance activities. At KSC, Pan Am is actively pursuing a Maintenance Performance Audit Program and Work Volume Indicator analyses to assist the entire SPC effort to set standards and evaluate the effectiveness of maintenance programs for Ground Support Equipment. At NSTL, 11 Performance Teams are implementing the Performance Objectives Matrix (POM) with significant results. Examples of improved performance include the reduction of time required to place a purchase order from five to 3.7 days; the increase in number of line items shipped per employee/week from 115 to 157; the reduction of the preventive maintenance backlog from 756 tasks in 1986 to 49 in 1987; and the closing out of trouble calls from 86 percent in 1986 to 98.9 percent in 1987 in the Mechanical/Plumbing shop. On average, these Teams have improved their performance 120 percent over their 1986 actual performance baselines.

All our Pan Am Projects participate in NASA-sponsored award events like the Manned Flight Awareness Honoree and Astronaut Snoopies. In 1987, the NSTL MAT team were Honorees at the Marshall Space Flight Center Program. At KSC, Pan Am is actively participating as an integral part of Lockheed's drive for Company of the Year recognition for Productivity and Quality.

SUMMARY:

It has been my direction that all Pan Am Projects supporting NASA activity continue to seriously pursue our goals as detailed in the Commitments to Action. While we have emphasized our accomplishments over our pitfalls or failures, it is sincerely the result of having more of the former. Our greatest concern at this time is ensuring continuing NASA support in our emphasis on activity toward these Quality and Productivity goals. Last December in Houston, the Project Managers and their local Productivity and Quality representatives from all four Pan Am NASA contract activities met with me to share ideas, identify problems and discuss solutions related to our individual and combined efforts to improve productivity and quality as members of the NASA team. I am confident this exchange and the resultant efforts at the individual projects will provide a sound basis for the continuing enhancement of NASA contract performance.

Organization: PERKIN-ELMER CORPORATION — GOVERNMENT SYSTEMS

SECTOR

Contact: David L. Burch, Director, Product Assurance

Address: 100 Wooster Heights Road

Danbury, CN 06810-7589

COMMITMENT TO ACTION:

Government Systems Sector is instituting a Quality and Productivity Improvement Plan which will focus on identification, assessment, and correction of the contributing factors of "unquality" and poor productivity. This commitment is made by the executive management with the strongest of intentions to improve the quality of our products, the quality of our services, the quality of the working life of our employees, and the overall productivity of the organization.

ACCOMPLISHMENTS:

We have completed our Quality Business Plan and it is in final review. Although the development of the Plan has taken slightly longer than first anticipated, the process is resulting in an improved product which will be well worth the effort.

With regard to the selected goals for 1987, the following is a brief summary on each area:

1. Improve the Quality of the Design Documentation. Two principal strategies were placed in motion in 1987 to improve our design documentation. First, we initiated imposition of a design review standard across all programs which ensures a systematic review of the design. A new design review standard (STD-26) requires that all programs shall have and document four specific technical reviews: (1) Requirements Review; (2) Concept Design Review (CR); (3) Preliminary Design Review (PDR); and (4) Critical Design Review (CDR). Each of these reviews have prerequisites and checklists to ensure thorough technical and managerial content.

Second, we have implemented a policy that requires all assembly level drawings and electrical schematics to be produced on CAD equipment. The inherent high quality, rapid through-time, and self-checking features of our CAD equipment make this a natural productivity move.

2. Develop a Cost of Quality Accounting System. Several working sessions have been held on this topic and progress is being made. Difficulty has arisen from the wide range of products produced in the Government Services Sector. Common measurable factors among the product lines are limited and those which we can identify are perceived to not provide sufficient indicators of quality costs to be meaningful. Presently, we are assessing guidelines for our R&D programs which constitute the majority of our current and near-term work load. Typically, these programs have extensive engineering change activity as the design matures under usually critical schedule constraints and very challenging technical issues. Where to draw the line and how to define the cost categories in a dynamic state-of-the-art design is not proving to be easy. We are interfacing with several peer companies, consultants, and individuals at NASA to develop a constructive and objective measurement system for quality costs.

- 3. Make Better Use of Supplier Performance Information. Quality, cost, and delivery performance factors are measured on all suppliers of contract deliverable products. Traditionally, this data has been maintained in separate data bases: one in Quality Control and the other in the Purchasing area. Although the information on quality performance was available in a printout form, it was not real time, i.e., the buyers could not access the information at their terminals. We are presently completing a software program which will combine the separate data bases into one file which can be accessed by either Quality or Purchasing personnel at their work station. Additionally, either department can "flag" a supplier for a negative trending performance factor to alert all parties to the problem in real time. Their new and improved distribution of information will greatly assist the buyers in their supplier selection, and will provide much-needed planning visibility for source inspection, receiving inspection, and the quality audit functions.
- 4. Improve Quality and Productivity Communications. Evoking the approach described in our commitment to NASA in March 1987, we embarked upon a strategy which would ensure full communications from the top down and strongly encourage response from the bottom up. In August, the Company initiated a drive to light a fire under our employee suggestion/action program which historically generated no more than 100 inputs a year. With newsletters, new forms, and a multitude of eye-catching pickup stations, we dedicated the "Speak-Up" Program with a management guarantee that all inputs would be promptly and effectively acted upon. In the first quarter of activity we have received over 150 inputs and the turnaround time is achieving the goal of 30 days.

In parallel, we initiated a top-down program which requires that every employee participate in a communications meeting led by their department manager. Business information is discussed and a corporate video presentation of current events called IN FOCUS is shown. Held quarterly, these sessions are providing every employee with the opportunity to be informed as never before and to take an interactive part in the process.

We are presently preparing an illustrative pamphlet on our Quality and Productivity Program which will be provided to all employees, suppliers, and customers. It is intended to provide general knowledge of our program and guide all concerned to specific individuals/departments for more detailed information.

In conclusion, we have made progress toward each of our declared goals for 1987 and we intend to remain focused in these areas throughout 1988.

Organization: RAYTHEON SERVICE COMPANY—LOGISTICS SUPPORT DEPOT

Contact: Stanley L. Groover, C.P.L., Program Manager

Address: Goddard Space Flight Center

Code 539

Greenbelt, MD 20771

COMMITMENT TO ACTION:

Provide automation to the procurement, receipt and shipment of selected classes of supply items. This will include financial/funds control and status information to customers.

ACCOMPLISHMENTS:

Raytheon's commitment to action to provide automation via the <u>Raytheon operated</u> Logistics & Supply computer system for the procurement, receipt and shipment of selected classes of supply items did not occur as scheduled for two reasons:

- 1. The interface with Goddard Space Flight Center (GSFC) financial management system was quite complex, and
- 2. While we were working these issues toward a successful completion, the <u>GSFC</u> Government Procurement Group initiated a study to automate the Government procurement system utilizing the <u>GSFC</u> operated administrative computer system.

This action in effect will accomplish in a more general manner what we were to accomplish on a more selective basis. While we were disappointed in this action, we continue our commitment to productivity in many ways throughout the Logistics Operation at Goddard. For example, we manage and operate the NASA Logistics Support System at GSFC in a most efficient and highly responsive manner using an interactive on-line computer system which also supports Bar-coding throughout the operation.

Organization: RCA GOVERNMENT SERVICES

Contact: David A. Schindler, Manager, Quality Process

Address: Route 38

Cherry Hill, NJ 08358

COMMITMENT TO ACTION:

Educate all management personnel in Quality and Management Improvement processes. Establish Quality Improvement Teams and Quality Circles. Monitor performance against Quality objectives.

ACCOMPLISHMENTS:

During 1987, we completed the training of 34 percent of our management staff in our Quality and Management Improvement Process (Q&MIP), and we now stand at a total of 57 percent of management trained. The managers participated in a 5-day Quality Management Training Process (QMTP) course held either in Cherry Hill or at a field project. Efforts were also devoted to additional training of Leaders and Facilitators, to more easily enable Q&MIP implementation both in our Headquarters and field operations. Q&MIP training also included a number of customer personnel so that customer/contractor teams could be formed as required. Renaissance Management Resources Group (RMR), a Quality Process consulting firm, was subcontracted to provide four instructors for each of the 10 training sessions held during the year.

An Executive Quality Council (EQC), chaired by the Division Vice President and General Manager, RCA Government Services, functioned to identify critical problems to be addressed by Quality Lead Teams appointed by the EQC. While some Lead Team assignments resulted in generating further problem statements to be addressed by Quality Improvement Teams (QIT), a number of QIT's were appointed and organized as a result of problems identified by both Headquarters and field operation management, without Lead Team involvement. From the organization of the QIT's and as a result of training efforts, an increasing employee participation in Quality Circles (QC) developed. A Quality Improvement function (called "Quality Process") was established. This organization implemented training processes, aided in the implementation of Teams and Circles, and designed an initial progress monitoring/reporting system.

RESULTS:

While 57 percent of our management was trained and there is a strong commitment from top management, our overall employee participation rate, in QIT's and QC's, has not reached an acceptable level. In contrast, in cases where the process has been used, very positive results have been obtained. Breakthroughs have been obtained on operational improvements, marketing activities, and in one notable case we received an award from a Government customer for training their personnel, facilitating their QIT, and aiding them in achievement of a breakthrough on a serious problem.

We intend to continue management and leader/facilitator training during 1988. Our 1988 goal for management training level is 83 percent. In addition, we have established a 1988 participation goal that will amount to over a 500-percent increase in employee participation. We believe that our experience thus far indicates strongly that participation will yield positive results.

Organization: ROCKWELL INTERNATIONAL CORPORATION—SPACE

TRANSPORTATION SYSTEMS DIVISION

Contact: C. O. Baker, Division Director, Quality Assurance

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Downey, CA 90241

COMMITMENT TO ACTION:

We have a plan, which we are implementing, that will regain and build upon our record of quality and productivity based on our earlier delivery of four Shuttle orbiters. This plan for building OV-105 is entitled Coming Out Stronger.

ACCOMPLISHMENTS:

Our action was contained in a master plan, <u>Coming Out Stronger</u>, in which we developed strategies to help the NASA-Industry team rebound from the Challenger accident. It builds upon our record of quality and productivity demonstrated during spares modifications, repairs and test. Specific actions were taken in three areas: Controls, Commitment, and Confidence, which represent our three-pronged C³ approach. Our efforts will continue as long as we have production-related activities supporting the Shuttle program. At this stage we have accomplished the following:

1. Controls.

- Provided selective rechecks for requirements in terms of tolerances, processes, materials and chemical usage.
- Reduced unincorporated Engineering Orders.
- Reestablished on-the-floor Engineering/Quality Assurance support teams for the shops.

2. Commitment.

- Expanded and redirected our Product Quality Improvement Councils (PQIC's) to not only correct errors, but to review processes and materials to prevent errors.
- Revised our "Doing Things Right" presentation to expand the focus in-house and at suppliers to place greater emphasis on reducing our potential for in-process nonconformances.
- Provided visual excellence commitment displays in every shop area and at selected suppliers.

3. Confidence

- Reassessed objectives, completeness and planned management use of data.
- Developed product and process spot checks to ensure in real time that suppliers and in-house are properly building hardware.

BENEFITS:

The best indicator of the results of our effort is the reduction in the level of nonconformance experience. Our FY 1987 nonconformance rate has improved by 31 percent from the previous year.

We have found our approach to be successful, and we have made refinements as we receive feedback.

PROBLEMS:

Our plan is ambitious, involves everyone in our Division and our Program, and takes more time than we would like to make it all happen.

Organization: THE SINGER COMPANY—LINK FLIGHT SIMULATION DIVISION,

SPACE PROGRAMS OPERATIONS

Contact: Dr. Riley D. McCafferty, General Manager

Address: 2224 Bay Area Boulevard

Houston, TX 77058

COMMITMENT TO ACTION:

Evaluate the technical expertise of the NASA Space Transportation System (STS) facility maintenance and operations (M&O) for potential use of their personnel and subcontractors to Link in the Shuttle Mission Training Facility (SMTF) Upgrade development task.

ACCOMPLISHMENTS:

Our major job this period has been the re-hosting of the Shuttle Mission Simulator (2 1/2 million lines of code) and we provided improvements from the beginning. Knowing that Space Transportation System Operations Contract (STSOC) was to take over from us after the upgrade, we decided to maximize the use of those contractors where outside (subcontract) help was needed.

Accordingly, Singer-Link employed, on a subcontract basis, a number of STSOC engineering personnel to assist in performing design and maintenance/operations tasks associated with the SMTF Upgrade Step 1 Program. The resulting productivity was very high.

The STSOC engineering personnel were generally ex-Link employees and therefore were able to contribute to programmatic goals with minimal training and orientation much less than other potential subcontract personnel who would be unfamiliar with the NASA/Johnson Space Center SMTF). This kept training and hiring expenses down. Any inefficiency caused by subcontracting was overcome by overall lower costs while meeting very optimistic schedules.

BENEFITS:

At program completion, maintenance and operations functions of the upgraded SMTF are to be transitioned fully to STSOC. Therefore, transition costs (personnel training and familiarization) will have been minimized by involving the same STSOC personnel working in the development phase of the SMTF Upgrade, who have been performing the maintenance and operation functions of the upgraded facility. These cost savings are projected and are yet to be realized as the program has not yet concluded. However, it is obvious that the use of STSOC contractor personnel will cut the transition costs by 75 percent or more, giving the Government a big bang for the buck.

In addition, positive results have been achieved with regard to providing high-quality products by utilizing STSOC contractor personnel in development and maintenance/operations tasks of the SMTF upgrade.

Organization: SPAR AEROSPACE LIMITED—REMOTE MANIPULATOR SYSTEMS

DIVISION

Contact: Michael Parfitt, Director of Product Assurance and Productivity

Coordinator

Address: 1700 Ormont Drive

Weston, Ontario M9L 2W7

Canada

COMMITMENT TO ACTION:

Spar Remote Simulator Systems Division (RSSD) has a mature, fully documented Productivity and Quality Improvement Plan. The process has been in place for 4 years, and, as it evolves, we issue a new plan each year to address specific and general issues.

ACCOMPLISHMENTS:

One of the general issues appearing in the 1987 Plan was to continue to expand the percentage of staff who directly participate in the improvement initiatives and multidiscipline working groups. One hundred percent of staff receive communication on Improvement Plans on a regular basis. In 1987 we set out to increase participation from 30 percent up to 40 percent; we actually achieved 36 percent.

Our Improvement Plan for 1987 included a number of specific issues, some general issues, and the activities of multidiscipline working groups who identified real-time initiatives.

The general issues included the following:

- Increased communications. We believe that an increase was achieved in this very important area through increased technical seminars, lunchtime information seminars and a very active newsletter that has brought about a high level of interest and participation.
- Growth of our Suggestion Plan. During 1987 a growth of 25 percent was achieved.
- Increased middle-management involvement. We now have middle management represented in all of the working group activities, either directly or in support of their staff.
- Incorporation of results into proposals for new business. The benefits created through improvement initiatives (e.g., CAD, CAE, Networking) are now automatically reflected in new business proposals and are now our normal way of doing business.

Organization: TRV

TRW-OMV PROGRAM

Contact:

A. M. Frew, Project Manager

Address:

One Space Park

R12/1612

Redondo Beach, CA 20278

COMMITMENT TO ACTION:

Joint TRW/Marshall Space Flight Center (MSFC) initiatives which will enhance productivity and quality on the Orbiting Maneuvering Vehicle (OMV) program.

ACCOMPLISHMENTS:

Toward the committed objective, potential actions were identified at the Second NASA Symposium. These included:

- Quality of parts

- High visible team emphasis on safety

- Early manufacturing/producibility/productivity

- Complementary tasks for MSFC/TRW focused on strengths of each organization

- Explore introduction of Productivity measures

- Common real-time data base

As a first step, the TRW and MSFC Project Managers met with the MSFC Productivity Office to develop an understanding of the on-going MSFC efforts. Several initiatives already underway at Marshall have the potential for OMV Project application and are under joint evaluation. Among these are welding techniques and specific applications of composite structure design being developed by the MSFC Productivity Center.

BENEFITS:

Specific initiatives were jointly developed although a formal joint plan has not been published. These include:

- A Failure Modes and Effects Analysis (FMEA) review focused on criticality catagories and a resultant action to upgrade electrical, electronics, and electromechanical parts.
- An early review of lessons learned on prior programs and strong, focused effort on safety resulting in exemplary MSFC/TRW performance at the Phase 0 Ground and Flight Safety Reviews.
- Joint assessment of manufacturing and assembly techniques for improved product quality and multiple vehicle re-use.
- Use of the Ada programming language to minimize development and life cycle costs.

Organization: TRW—SPACE & DEFENSE SECTOR

Contact: Mr. H. E. Cypert, Jr., Vice President, Quality

Address: One Space Park

Redondo Beach, CA 90278

COMMITMENT TO ACTION:

Implement specific projects aimed at quality awareness and continuous improvement in TRW Space & Defense Sector products and services. These projects are under the auspices of our sector-wide program which reaches every employee and function, and is institutionalized in the business and management reporting systems.

ACCOMPLISHMENTS:

The TRW Space & Defense Sector has developed an integrated quality improvement program that links quality and management to total performance. The program further enhances TRW's long-standing commitment to providing superior quality products and services to its customers.

Since the Second NASA Symposium on Quality and Productivity in 1986, the quality program has helped the sector achieve many of its objectives through improvement initiatives launched at the operating unit level, greater management responsibility, and a high degree of employee involvement. The full duplex system that has been created leverages management and employee activities to help achieve targeted operating results.

The Quality Awareness and Continuous Improvement Program served as the seed for the Space & Defense Sector's quality effort. The program received top management support at the sector and corporate level through close interaction with the TRW Quality Council headed by the company's president and chief operating officer. Over the past year, the quality program has been successful in making the sector's 30,000 employees aware that quality products and services are everyone's responsibility, not just management or the quality assurance function.

Since last year, Space & Defense had improved the quality of product design. The sector has developed a corrective action process to examine, analyze, and correct the root causes of design discrepancies. In addition, Corrective Action Boards were set up to ensure producible designs with minimum changes. An engineering Corrective Action Board was established following the NASA Symposium; it represents a first in tracking engineering orders in the design-to-manufacture interface.

The Space & Defense Sector improved the parts acquisition process through actions such as a supplier rating system, standardized parts, and engineering involvement earlier in the manufacturing process. It also upgraded management systems and standards with improved training and educational programs that focus on superior quality. The sector conducted its own symposium with subcontractors this past year to encourage their quality efforts and to obtain additional insights.

To forge stronger ties between quality and operating performance, a set of macro and micro measurement indices were developed last year. The Quality Process Evaluation and Reporting System (QPERS), looks at managing key processes such as design, inspection, test, and administrative functions much the way the sector manages its

financial and technical resources. QPERS is a structured, disciplined approach that stresses management involvement and long-term defect correction. Moreover, it ensures that quality improvements become imbedded in the system.

BENEFITS:

Space & Defense's quality improvement program has generated important results with key customers. Following a 1987 Contractor Operations Review, the Air Force singled out the sector's quality improvement program and its impact on manufacturing and engineering as especially effective in producing better systems, products, and services.

Moreover, the sector's quality program underscored TRW's long-term commitment to quality in several areas, particularly spacecraft. More than 90 percent of TRW-built spacecraft have exceeded their design lives.

In general, the Space & Defense quality improvement program has been successful. By involving employees throughout the organization, it has raised awareness and has given people a stake in improving their performance. The "think quality" attitude is fast becoming a major part of the culture, and is having a positive effect on bottom-line results. More important, it allows TRW's Space & Defense Sector to maintain its reputation for providing outstanding value to its customers.

Organization: UNISYS DEFENSE SYSTEMS

Contact: Frederick F. Jenny, President

Address: 8201 Greensboro Drive

McLean, VA 22102

COMMITMENT TO ACTION:

Quality/Productivity Directors from each group will continue to meet monthly with the Director of Quality/Productivity for Unisys Defense Systems to develop and implement a total improvement process.

ACCOMPLISHMENTS:

This action was not only accomplished but expanded into a support structure that included:

- The Executive Overview Board chaired by the President of Defense Systems and composed of his direct reports.
- Group Steering Committees chaired by Group Presidents and composed of their direct reports.
- Improvement Teams at various levels across Unisys Defense Systems.

It was anticipated that communications and teamwork among the council members would result in a superior total process that is Unisys-specific and standardized across Unisys Defense Systems but is sufficiently adaptable to meet the unique characteristics and needs of individual groups and functional units. Although initial development of the total process will require approximately 2 more years, significant progress has been made toward that goal. Our team approach is resulting in cost savings through elimination of duplication of effort, through sharing of existing resources, and through identification of potential improvement initiatives.

BENEFITS:

Specific examples of successful improvement initiatives are presented below.

- <u>Vendor Surveillance</u>. Unisys personnel supported each other in supplier surveillance activities at local sites to reduce travel costs and lost productivity which would have occurred by long distance travel.
- <u>Cost of Quality</u>. A system was defined and implemented by the Custom Systems Division (CSD) to effectively collect and measure costs associated with prevention, appraisal and failure activities in manufacturing. As a result of this system, CSD successfully passed a Government defense-wide audit on Cost of Quality. Cost of Quality procedures have also been developed in nonmanufacturing areas (e.g., purchasing, finance, transaction processing, administrative support) and preliminary results are encouraging.
- Proposal Preparation. Unisys Defense Systems has unified the approach to proposal generation through the development of a Proposal Development Manual which is the basis for all proposals. It is particularly helpful in providing standards for co-

generated proposals. Proposal generation capability is greatly improved through development of electronic data bases for such areas as management draft proposals, work breakdown structure, statements of qualification and proposal information packages. Fifty-six similar areas relating to proposal generation have been identified for future automation.

- Measurement. The importance of measurement was stressed by top management. All major programs have identified Quality and Productivity indicators which are monitored as part of closed-loop corrective action systems. Emphasis is in the white collar environments (e.g., marketing, finance, engineering, software development) in addition to the more traditional factory measurements. In many widely varying functions organizations, data from trend charts and other sources are summarized monthly using the Objective Matrix.
- <u>Suggestions and Recognition</u>. The Unisys Employee Suggestion Program provides an employee communications vehicle for inputting potential improvement initiatives to management, with a potential financial award to eligible employees whose suggestions are adopted. The program has been enthusiastically received by employees and has resulted in significant savings for Unisys and our customers. A Presidential Award for Quality/Productivity has been established and the first award has been given. Other suggestion and recognition programs have been successfully implemented at group, division, and project levels.
- <u>Training</u>. With the help of a consulting firm, quality/productivity training needs are currently being assessed throughout Unisys Defense Systems. This assessment will result in the development of high-priority training modules which will also serve as pilot tests for the development of a total modular training system. The training system will be an important cornerstone of the quality/productivity improvement process, and will be standardized across Unisys Defense Systems but sufficiently adaptable to meet the unique characteristics and needs of individual groups and functional units.

Organization: UNITED STATES AIR FORCE SYSTEMS COMMAND

Contact: Colonel J. K. Bergen, USAF, Assistant Deputy for Manpower and

Personnel

Address: DCS/Test and Resources

Headquarters Air Force Systems Command Andrews Air Force Base, DC 20334-5000

COMMITMENT TO ACTION:

The Command Model Installation Program allows maximum freedom to local units in order to seek relief from impediments to productivity and to try new ideas and procedures.

ACCOMPLISHMENTS:

The Air Force Systems Command Model Installation Program (CMIP) is patterned along the lines established by the Department of Defense. We are attaining our intended productivity goals to identify and remove outdated regulations, policies, and practices. Specifically, we are directing attention to removing those outmoded rules, regulations, or traditional work practices which have a highly disruptive effect on work force motivation. Identifying unproductive and unnecessary work activity remains a high Command priority for 1988.

Organization:

UNITED STATES ARMY MATERIEL COMMAND

Contact:

Colonel Gifford D. Wilson, USA, Deputy Chief of Staff for

Management and Productivity

Address:

5001 Eisenhower Avenue Alexandria, VA 22333-0001

COMMITMENT TO ACTION:

Reduction of material acquisition time from initial concept through delivery of systems to the user by supporting the Army Streamlined Acquisition Program.

ACCOMPLISHMENTS:

In pursing the Department of Defense's (DOD) goal to reduce materiel acquisition time, the Army Materiel Command has taken the following actions:

- Established an acquisition streamlining advocate network throughout the command.
- Participated in a DOD Acquisition Streamlining Conference in Washington, DC in March 1987. An individual and an organization within the Army Materiel Command were recognized for contributions in this area.
- An acquisition streamlining course is being developed and will be distributed throughout the organization.
- Army Materiel Command is serving as Executive Agent for the Department of the Army by leading a task force which is revising the Army's acquisition regulation AR 70-1 (Systems Acquisition Policy and Procedures).
- Continuing emphasis is being placed on the acquisition of nondevelopmental items (NDI) with success such as the 9mm Baretta handgun, Commercial Utility Cargo Vehicle (CUCV), and Mobile Subscriber Equipment (MSE).
 - Established a set of initiatives to streamline the procurement process.

Organization: UNITED STATES ARMY MATERIEL COMMAND (Continued)

Address: U. S. Army Armament, Munitions, and Chemical Command

Rock Island, IL 61299-6000

U. S. Army Test and Evaluation Command Aberdeen Proving Ground, MD 21005-5055

U. S. Army Troop Support Command

4300 Goodfellow Avenue St. Louis, MO 63120-1798

U. S. Army Security Affairs Command

5001 Eisenhower Avenue Alexandria, VA 22333-0001

COMMITMENT TO ACTION:

Development of effective productivity measurement systems.

ACCOMPLISHMENTS:

The U. S. Army Armament, Munitions, and Chemical Command has developed two systems for providing productivity measurement indices: Total Installation Productivity Measurement Project (PMP) and White Collar PMP. Total Installation PMP incorporates capital costs of production, direct labor and indirect costs in determining productivity improvements compared to a base period. White Collar PMP users measured work units to determine the period and cumulative productivity compared to a base period. Projected work load and productivity are then used to forecast budget and staffing requirements. Total Installation PMP indices have been implemented at Pine Bluff Arsenal and McAlester Army Ammunition Plant. White Collar PMP has been initiated in the Procurement Directorate at Pine Bluff Arsenal and in the Comptroller Office, Headquarters, U. S. Army Armament, Munitions, and Chemical Command.

The U.S. Army Test and Evaluation Command has implemented a productivity measurement system at all the proving grounds to monitor test mission productivity. Indices are reported quarterly. There have been significant improvements reported over the base year.

The U. S. Army Troop Support Command has automated its overall command productivity measurement system. Using nine output indicators, such as technical pages published, requisitions processed, and procurement work directives awarded, a productivity ratio for the command is computed against the base year FY 1985. The results have been significant: in FY 1986 the productivity increase ratio for the command was 6.7; in FY 1987, it was 13.4. The goal is to achieve a productivity increase ratio of 20.0 by FY 1992.

The U. S. Army Security Affairs Command (USASAC) has made significant progress toward completion of a comprehensive Army Materiel Command-wide security assistance productivity measurement model. Analysis of FY 1987 data reveals that a few discrepancies exist. Once these have been eliminated, the model will be provided to the Army security assistance community. Data will be collected semiannually. In addition, the productivity measurement model for USASAC as a separate activity is also nearing completion. The model will be completed during the second quarter, FY 1988.

Organization: UNITED STATES ARMY MATERIEL COMMAND (Continued)

Address: U. S. Army Aviation Systems Command

4300 Goodfellow Avenue St. Louis, MO 63120-1798

U. S. Army Communications-Electronics Command

Fort Monmouth, NJ 07703-5000

U. S. Army Missiles Command Redstone Arsenal, AL 35898-5000

U. S. Army Tank-Automotive Command

Warren, MI 48397-5000

COMMITMENT TO ACTION:

Concentration on productivity improvement through the human aspects of the workplace. Efforts are underway at several locations to engender a more participative and less autocratic environment.

ACCOMPLISHMENTS:

The U. S. Army Aviation Systems Command completed two studies in the Comptroller and Materiel Management Directorates using the Organizational Productivity Team Program. However, management emphasis has shifted to the implementation of a Department of Defense demonstration project for civilian personnel management; therefore, no other studies are currently scheduled. As a participant in the demonstration project, the U. S. Army Aviation Systems Command will be examining innovations in recruiting, classifying, and compensating civilian employees. Ground work is being conducted for an FY 1989 implementation.

The U. S. Army Communications-Electronic Command has made tremendous progress in training its managers in participative management principles. The command has trained 20 in-house facilitators and has furnished a dedicated Quality Training Center for the Managing for Productivity training. The focus of the training is to introduce managers from the same work area to the process of quality improvement. To date, 203 of the command's managers have completed the program. Benefits are a pronounced increase in the awareness of the quality process and a common language among managers.

The work force at the U. S. Army Missile Command is unquestionably responsible in their team efforts to put quality first; to surpass the familiar, to be innovative, and to promote change. During the past year, this dedication has been demonstrated by the fact that the command has been at the forefront of rapid program advances in the Chemical Agent Resistant Coatings and Camouflage Pattern Painting programs. It also received recognition as a leader in Automatic Test Equipment and Test Program Set activities within the Department of the Army. As a result of aggressive pursuit of spare and repair parts acquisition, accelerated filling of supply requisitions, and heightened activity by logistics assistance representatives, all the missile systems managed by the U. S. Army Missile Command achieved a readiness posture equal to or exceeding the Department of the Army goal.

The U. S. Army Tank-Automotive Command has trained all managers and supervisors in the Resource Management Directorate in Performance Management. During January 1988, two additional facilitators will be added to continue the implementation of the program throughout the command. The benefits realized thus far from this effort include the following:

- All supervisors in the Resource Management Directorate have identified areas for improvement, graphed accomplishments, and reinforced their organizations for their improvements.
- Lines of communication have been opened between management and non-supervisory personnel through effective feedback.
- Managers and supervisors have a new awareness of the improvements the employees are achieving. The focus has been changed. Supervisors focus on improvements rather than lack of improvement.

Organization: UNITED STATES ARMY MATERIEL COMMAND (Continued)

Address: U. S. Army Depot System Command

Chambersburg, PA 17201-4170

COMMITMENT TO ACTION:

Expansion of the Model Installation Program (MIP) throughout the depot system.

ACCOMPLISHMENTS:

On April 1, 1987, the Department of the Army permitted the expansion of the Model Installation Program beyond the original "test" sites. Two Army depots were among the original participants of the program. Because of the positive results, the U. S. Army Depot System Command elected to expand the program to its 13 depots, its depot activities, as well as headquarters.

During May 1987, representatives of all depots attended an Army Materiel Command-sponsored conference on the Model Installation Program. Orientation briefings occurred throughout the depot system. The program was implemented at all installations on June 1, 1987. During the first 6 months, 327 model installation waiver requests were submitted by employees. (Waiver requests to existing Army regulations and/or policies which, if approved, would reduce systemic "red tape.") Approval rate was 68 percent during the period.

With the expansion of the program, we have noted an increase in processing time resulting from the enthusiastic response from the installations and lack of additional resources to administratively process the waivers. We remain optimistic that the increased quality of waiver requests will produce increased quality in depot operations. Our goal: Excellent Installations -- The Foundation of Defense.

Organization: UNITED STATES ARMY MATERIEL COMMAND (Continued)

Address: U. S. Army Laboratory Command

2800 Powder Mill Road Adelphi, MD 20783-1145

COMMITMENT TO ACTION:

Expeditious transition of technology from the laboratories to the field equipment provided the soldier.

ACCOMPLISHMENTS:

The concept of employing a small team of laboratory scientists and engineers, a user representative, and a development engineer to accelerate the insertion of new technologies in being implemented as a part of the Army 21 umbrella concept effort.

A 2-week strategy meeting has been scheduled for February 1988. The meeting will pursue the exploitation of emerging technologies in greater depth by the use of National System Working Groups (NSWG).

Organization: UNITED STATES DEPARTMENT OF AGRICULTURE—

AGRICULTURAL RESEARCH SERVICE

Contact: W. H. Tallent, Assistant Administrator

Address: Office of the Administrator

Administration Building, Room 358-A

Washington, DC 20250

COMMITMENT TO ACTION:

A more deliberate and structured effort will be implemented to bring Agricultural Research Service (ARS) research results to the attention of industry in the agricultural economy.

ACCOMPLISHMENTS:

In 1987, the ARS implemented a very aggressive and structured program for Technology Transfer. In order to ensure that the program was given the highest level of attention, the ARS Administrator assigned Technology Transfer Coordination to the Office of Cooperative Interactions (OCI). OCI is a small office within the Office of the Administrator which focuses on ARS policy, External Affairs, technology transfer including the ARS patent program.

The ARS National Program Staff (PS) initiated the kickoff for the program by holding a meeting in May 1987, in Washington, which consisted of high-level industry officials and ARS senior- and middle-level management. The objective of this meeting was to solicit input on the needs of industry for the ARS priority research setting process.

The second phase of implementation was to familiarize the ARS research scientists with the provisions and the new responsibilities contained in the 1986 Technology Transfer Act (P. L. 99-506) and the 1987 Presidential Executive Order 12591 (EO 12691) "Facilitating Access to Science and Technology." Special Technology Transfer orientation meetings are being held at all ARS locations to inform scientists of their new responsibilities and flexibilities under the Act. Additionally, a video tape on P.L. 99-506 is being developed to continue the orientation program especially for new scientists.

Technology Transfer meetings are being held in ARS laboratories throughout the country. The objectives of these meetings are to make industry more aware of the kinds of ARS research that is done in ARS laboratories, what some of our research accomplishments are, what ARS facilities are available, and what scientific expertise is and most importantly, the potential commercial applications as a result of this research.

An integral part of the Technology Transfer Program is TEKTRAN, the ARS computerized data base of new, largely unpublished research. It was first made available for direct access by industry in late 1986. To date, more than 300 firms have been granted access.

Two significant research accomplishments by ARS scientists were selected (with assistance from NPS) for a major "push" to achieve industry adoption. These were biodegradable starches and polytherm.

A cooperative research and development agreement has been signed with a small industrial firm to develop and market "biodegradable plastics" from corn starch. The potential U. S. market for biodegradable plastics is huge especially as additional environmental restrictions are placed on the sale of nondegradable plastics. Considerable press coverage has been given to this invention, because of the favorable environmental aspects of biodegradable plastics over nondegradable plastics.

ARS has discovered and applied for a patent on POLYTHERM, a new fiber treatment technology which can significantly improve the properties of cotton and wool materials. The process allows fabrics to absorb heat when it is warm giving the cooling effect and gives off heat when it is cool imparting a warming effect. POLYTHERM also improves the ability of cotton fabrics to release oily soils and is more abrasion resistant thereby avoiding pilling.

The POLYTHERM technology showed potential for application to a wide variety of consumer products such as outdoor clothing, gloves, shoe liners, drapery materials and many other end uses, so a new approach was used to acquaint the textile apparel industry with the technology. A technology information package is prepared in cooperation with the National Technical Information Service (NTIS). NTIS has sold over 50 copies of the information package for \$325. The trade publications and popular science journals have given excellent coverage of this technology. Several hundred inquiries have been received from large multinational companies to small apparel manufacturers to individual consumers requesting additional information.

BENEFITS:

Implementation of the program is meeting ARS objectives. The program began in May 1987, and already we have had 15 Technology Transfer meetings and completed seven cooperative Research and Development Agreements with industrial firms involving a wide range of research and commercial adaptation of that research; 35 additional R&D Agreements are under negotiation; and a consortium is being implemented. The consortium consists of three industrial firms, the University of Illinois, and the ARS Northern Regional Research Center (NRRC).

The approach of the program has been successful. The success is measured by the response that the agency has had from industry in attendance to the Technology Transfer meetings, the number of Cooperative Research and Development Agreements which have been completed and are under way, and the increased number of patent licenses executed under negotiation on ARS inventions.

Organization: UNITED STATES DEPARTMENT OF COMMERCE—OFFICE OF THE

ASSISTANT SECRETARY FOR ADMINISTRATION

Contact: Alan R. Balutis, Director for Budget, Planning and Organization

Address: Washington, DC 20230

COMMITMENT TO ACTION:

The Department of Commerce's productivity improvement program, Project PRIDE, stresses the theme that productivity improvement must be addressed systematically to produce continuing and significant results in Commerce organizations. We employ a broad spectrum of program and administrative techniques to achieve productivity improvement that includes consolidations; increased application of automation in all forms; quality circles; work simplification; training; as well as improved management policies, procedures, and practices.

The key elements of the program are a strong commitment from the Secretary on down, management and employee awareness and involvement, a strong incentives program, accountability and valid measures, and well-defined written goals and objectives.

ACCOMPLISHMENTS:

- 1. Productivity Improvement Projects. We responded to the President's program by adding 6 new projects to our existing inventory, bringing our total to 15. Fifty-three percent of the Department's eligible programmatic work force of more than 20,000 employees is now participating in Project PRIDE. One of our most successful participating organizations, the National Oceanographic Data Center, has already exceeded its project goal but its director continues to use his organization's project plan as a strategic planning tool. He is a typical progressive Commerce manager, relying on team building, employee involvement, retreats, and other techniques to prepare his organization for the 1990's. Another of our participating organizations, the National Technical Information Service, won the coveted U. S. Senate Productivity Award in 1987.
- 2. The Commerce-sponsored BankCard project. During 1987, we successfully demonstrated a quicker, cheaper way to administer Federal small purchase transactions. We are reducing small purchasing paperwork, saving money, managing expenditures, and making it easier for small businesses to sell to the Federal Government. We did it all simply by issuing Mastercard credit cards to selected employees for their use in making small purchases. The potential Government-wide benefits from this project are estimated to be in the tens of millions. Already, the BankCard demonstration project has been so successful that we have invited other agencies to join us. The Departments of Agriculture, Housing and Urban Development, Health and Human Services, Interior, and Labor have all received cards, along with the Environmental Protection Agency, the National Science Foundation, and others. More agencies will join the program during 1988.
- 3. Pioneer Fund, a productivity investment fund. The Assistant Secretary for Administration established the Pioneer Fund, a renewable \$250,000 pool, one of only five in Government, designed to inspire productivity improvement experiments and demonstration projects. Already, the Pioneer Fund has awarded over \$161,000 to five energetic Commerce managers who have the know-how to make their organizations

perform better. The five are trying out untraditional technologies like "smart" software. They are developing low-cost ways of measuring their performance, eliminating red tape, or just motivating their employees.

4. Employee recognition. We expanded our multifaceted incentives program this past year. An employee parking initiative now recognizes employees who have made outstanding contributions to their organizations. This initiative has been described in The Washington Times and Recreation News. We also launched a new productivity training program, "More with Less." It is noteworthy that graduates are asked to apply something they have learned in the program once they return to their work places. Their successes are highlighted in employee newsletters and awards are offered for outstanding achievements.

We also began offering ballpoint pens that bear the Project PRIDE logo to employees who have made meaningful contributions to their organizations. Several hundred pens were distributed during 1987; we hope that many more employees will earn a pen in 1988.

5. Privatization. The Office of Management and Budget asked the Commerce Department to lead the Government's investigation of the privatization of the National Technical Information Service (NTIS). NTIS is a \$20+ million enterprise that is the Government's clearing house for scientific and technical information. In late January 1988 we will meet with potential bidders to discuss our plan to privatize NTIS through the Federal Employee Direct Corporate Stock Ownership Program. Fed Co-Op, as the plan is known, will make employees part owners of the company chosen to provide clearing house services.

SUMMARY:

Last year, 1987, was a tumultuous time at the Commerce Department and our productivity program, Project PRIDE, was both a source of stability and a guiding principle for our employees. With the death of Secretary Malcolm Baldrige, the Department lost a leader revered for his ability to inspire the best from the Federal work force. In his honor, the Senate established a national quality award that will go each year to businesses that best uphold the former Secretary's ideals of quality service, product, and management. We launched the Export Administration from several components of the International Trade Administration. Under our new Secretary, C. William Verity, we added several initiatives to the Project PRIDE family of activities.

Organization: UNITED STATES NAVY—NAVAL AIR SYSTEMS COMMAND

Contact: J. Wm. Kerpelman, Deputy Director, Facilities Management Division

Address: Washington, DC 20361

COMMITMENT TO ACTION:

Naval Air Systems Command (NAVAIR) is taking steps to effect productivity/quality improvements through a change in our corporate culture. The change will result from command-wide implementation of participative management and productivity gainsharing.

ACCOMPLISHMENTS:

- 1. Change the Management Culture. A command Productivity Principal was appointed in November 1986, as were Productivity Principals in each major headquarters organization group and each field activity. The Productivity Principals' role is to coordinate and facilitate productivity improvement within their respective organizations.
- NAVAIR Command Headquarters has sponsored three command-wide conferences and seminars for educational and planning purposes.
 - (1) A 4-day NAVAIR Productivity Improvement Conference was held in Washington, DC, facilitated by Dr. D. Scott Sink of the Virginia Center for Productivity and Quality of Work Life and attended by 125 senior executives and managers of the NAVAIR headquarters and field activities.
 - (2) A 3-day productivity improvement planning conference was held in Albuquerque, New Mexico in July 1987 and attended by 40 Productivity Principals and key managers from headquarters and field activities. Two purposes were accomplished: (1) further education in productivity improvement and (2) to review a strawman corporate productivity plan and participate in its further development.
 - c. NAVAIR sponsored a Navy Deming seminar in San Diego, California, in December 1987. This seminar was attended by about 400 NAVAIR personnel and 200 other Navy, Air Force and Army personnel.
- The NAVAIR Corporate Plan of August 1987 prominently includes productivity improvement goals, objectives and special emphasis areas.

2. Participative Management.

- The February and July 1987 conferences are examples of participative management. Sessions utilizing the Nominal Group Technique (NGT) were conducted primarily to familiarize attenders with NGT; but questions addressed were real and provided participants' input relevant to command productivity improvement goals and plans.
- Nearly 40 Process Action Teams have been formed in NAVAIR headquarters. In addition, approximately 60 teams have similarly been formed and are working on process improvement in various field activities. Team members are from various segments of

the organization involved with the process under study, thereby providing a high level of participative management in removing productivity impediments under review.

- 3. Productivity Gain Sharing (PGS). The Naval Aviation Depot, Cherry Point, North Carolina has the first approved Productivity Gain Sharing program in the Department of Defense, and perhaps the first in all of the Federal Government. This program was implemented October 1, 1987.
- In addition to the depot, four other NAVAIR field activities have been designated Navy PGS test activities. They have received training and are in the process of assessing their readiness for PGS in conjunction with the Navy Personnel Research and Development Center, the Navy's in-house "expert" on PGS. To this date, no other PGS plans have been submitted for approval and implementation.

Organization: UNITED STATES NAVY—OFFICE OF THE ASSISTANT

SECRETARY FOR SHIPBUILDING AND LOGISTICS

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of the Navy

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COMMITMENT TO ACTION:

Presidential Executive Order 12552 established a Productivity Improvement Program for the Federal Government with the goal to improve the quality, timeliness, and efficiency of service to the public and to achieve a 20-percent increase in productivity in appropriate functions by 1992. The Department of the Navy (DON) plans to meet and exceed this goal by implementing targets, goals, strategies, and actions required for near-term and long-range improvement in the total performance of all DON operations described in the DON Total Performance/Productivity Improvement Action Plan.

ACCOMPLISHMENTS:

- 1. Near-Term Effort (Phase 1). Thousands of recommendations for improvement have been made and are being implemented in industrially funded activities as a part of the Secretary of the Navy's Industrial Improvement Program. Cost reduction goals have been set and the achievement of \$93 million savings in weapon system maintenance alone significantly exceeds the goal of \$60 million for fiscal year (FY) 1986. A 10 to 12 percent overhead cost reduction has occurred in naval shipyards, aviation depots and public works centers with steps being taken to preclude future growth. Other actions improving efficiency of operations include redefining the ship overhaul management process; improving procedures for forecasting, providing and managing needed materials and spare parts; and refocusing procurement of materials and services in support of industrial operations. Target reductions for FY 1988 have been set at \$200 million for aviation depots and \$60 million for weapons systems maintenance; shipyards have a goal of \$500 million by the end of FY 1989.
- 2. <u>Long-Term Effort (Phase 2)</u>. This phase involves continuous performance improvement through achievement of the initial 12 goals and action items of the DON Total Performance/Productivity Improvement Action Plan.
- The DON has established guidelines for achieving and measuring progress toward the President's Executive Order goal. Difficulties have been encountered with expressing realistic improvement measures in equivalent unit terms.
- The DON Action Plan has been implemented and is a living document which is guiding the DON toward continuous improvement through organizational cultural change.
- To accelerate implementation of Gain Sharing, a Secretary of the Navy Instruction is in the approval cycle. The Naval Sea Systems Command is the functional lead for DON Gain Sharing and 20 Navy/Marine Corps pilot activities have been designated. A communications network for sharing information has been established among the pilots. A Gain Sharing program has been implemented at Naval Aviation Depot, Cherry Point, NC which is the first activity-wide program in the Federal Government.

- To date, the DON has eliminated a 90-day cycle in certain competitive procurements, but otherwise has not achieved the goal of significantly shortening procurement lead time. However, insight to problems in the procurement process has been gained from performance action teams and solutions are being pursued.
- Existing performance/productivity training courses continue to be offered to Navy and Marine Corps personnel. The courses are designed to promote and enhance performance by increasing awareness and implementation of productivity improvements. A productivity awareness course is being developed for Headquarters and field activities.
- The DON has emphasized removal of productivity roadblocks via the Model Installation Extension Program which is a streamlined way to eliminate administrative impediments to improvements; however, current staffing levels are not adequate to process all proposals in a timely manner. Action is being taken to remedy the situation.
- The Naval Industrial Improvement Program has the long-term goal of improving the competitive position of Naval industrial activities. Successful implementation of competition between naval shipyards and private shipyards for ship overhaul has led to initiation of similar competition between naval aviation depots and private aircraft companies for airframe structure and component rework. As a result of winning a fixed price competition for submarine overhaul, Charleston Naval Shipyard has implemented a unique plan for sharing realized savings with shipyard personnel contributing to successful overhauls within cost and on time.
- To develop a master plan for aggressive use of capital investment programs, the DON high-performance action team on capital investments was formed. Smaller performance action teams have been formed to address issues within a master plan. Reactivation of the Component Sponsored Investment Fund is being addressed to provide the framework of a master plan through identification of productivity improvement thrust areas.
 - Zero-based review of DON financial regulations has not yet been initiated.
- A zero-based review of DON personnel regulations has been completed resulting in implementation of 23 changes in the civilian personnel system by DON with seven additional changes proposed to Office of Personnel Management. These changes are further intended to decentralize authority and permit managers more flexibility in management of personnel. All DON Civilian Personnel Instructions have been reviewed, 24 revised and 16 cancelled, eliminating 262 pages of "guidance."
- Each Navy and Marine Corps organization is developing productivity improvement plans at the activity level, emphasizing employee and line manager involvement in planning and implementation through performance action teams. Measures are being developed; however, equivalent unit measures have not been formalized for all.

OVERALL ASSESSMENT:

The DON productivity program is successfully progressing. Attention is being devoted to those areas identified as having difficulty. Additional goals and action items will be identified as the DON productivity improvement plan continues to mature throughout the Navy and Marine Corps.

Organization: UNITED TECHNOLOGIES—NORDEN SYSTEMS, INC.

Contact: Thomas M. Kolasa, Chief, Reliability Analysis

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Norwalk, CN 06856

COMMITMENT TO ACTION:

Norden is implementing an automated system of solder joint inspection on printed circuit boards using a Vanzetti Laser Inspection System.

ACCOMPLISHMENTS:

- 1. Norden did implement automated laser inspection on printed circuit board solder joints using the Vanzetti inspection system on two production contracts.
- 2. Customer authorization was received after submission of value engineering change proposals to the U.S. Army Missiles Command and the U.S. Army Communications-Electronics Command.
- 3. To date, over 10 million solder joints have been inspected using the laser system.

BENEFITS:

For those printed circuit boards that were laser inspected:

- Production touch-up operations have been eliminated.
- Early detection of various process-related anomolies have been identified and corrective actions taken.
- Productivity improvements have been realized and cost savings will be shared with Norden customers.
- Statistical process control has been facilitated by laser inspection.

Organization: UNITED TECHNOLOGIES—PRATT & WHITNEY

Contact: J. L. Ponder, Quality Plus Manager

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East Hartford, CT 06108

COMMITMENT TO ACTION:

Establish a total organizational approach to improving quality, productivity and participative involvement.

The process is called Quality Plus (quality, productivity, and participative involvement). It is a long-term commitment to customers, suppliers and employees. The key to this long-term approach is the centralized focus for all the activities needed to instill a quality culture in our day-to-day work.

ACCOMPLISHMENTS:

Since the beginning of Quality Plus, we have trained more than 3,000 of our employees. This includes 800 executives and managers from major divisions within Pratt & Whitney.

Our first phase, which we call awareness, is now complete. We have about 90 Quality Plus teams structured with all of our organizations. These teams are guided by a Senior Management Steering Committee which will start this year to focus on improving departmental business processes and systems. We plan to continue employee participation which has reached at least 20 percent in each functional organization.

In our manufacturing areas, we are restructuring our plants into relatively small business units, each run by a manager and each completely responsible for a charter part or similar parts such as disks, turbine blades and hubs.

Each manager has all the production, scheduling and technical support, direct labor and shop supervision needed to operate.

The factory "condominiums" include flowlines of all the machines and processes specifically dedicated to the production of the chartered parts.

Machine operators inspect their own output, using statistical process control and other statistical method, and are responsible for correcting nonconformances before the next "customer" in the production process.

This factory restructuring was started 3 years ago and it will take 4 more years to complete. Eye-opening results to date include the following:

- Improvement in scrap and rework by a factor of ten. We were operating at about 10-percent scrap in the past. The flowline is now yielding about 1 to 2 percent.
- Cost of quality inspection has been reduced 80 percent.
- Leadtimes have been reduced from 13 to 9 weeks.

- During the last 8 months, our flowlines have been 100 percent on schedule with no overdues.

LESSONS LEARNED:

As with any initiative of this magnitude, we have learned that it is imperative that each level within the organization be involved in the process. Managers and supervisors have to be given specific tasks requiring repetitive involvement. This reinforces the commitment and ensures that the highest priority opportunities are worked first.

We knew when we started Quality Plus it would be a long journey and the results would be evident as we began to change our management style and got people involved in solving problems. Management impatience for results must be overcome each step of the way. It is a long process.

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